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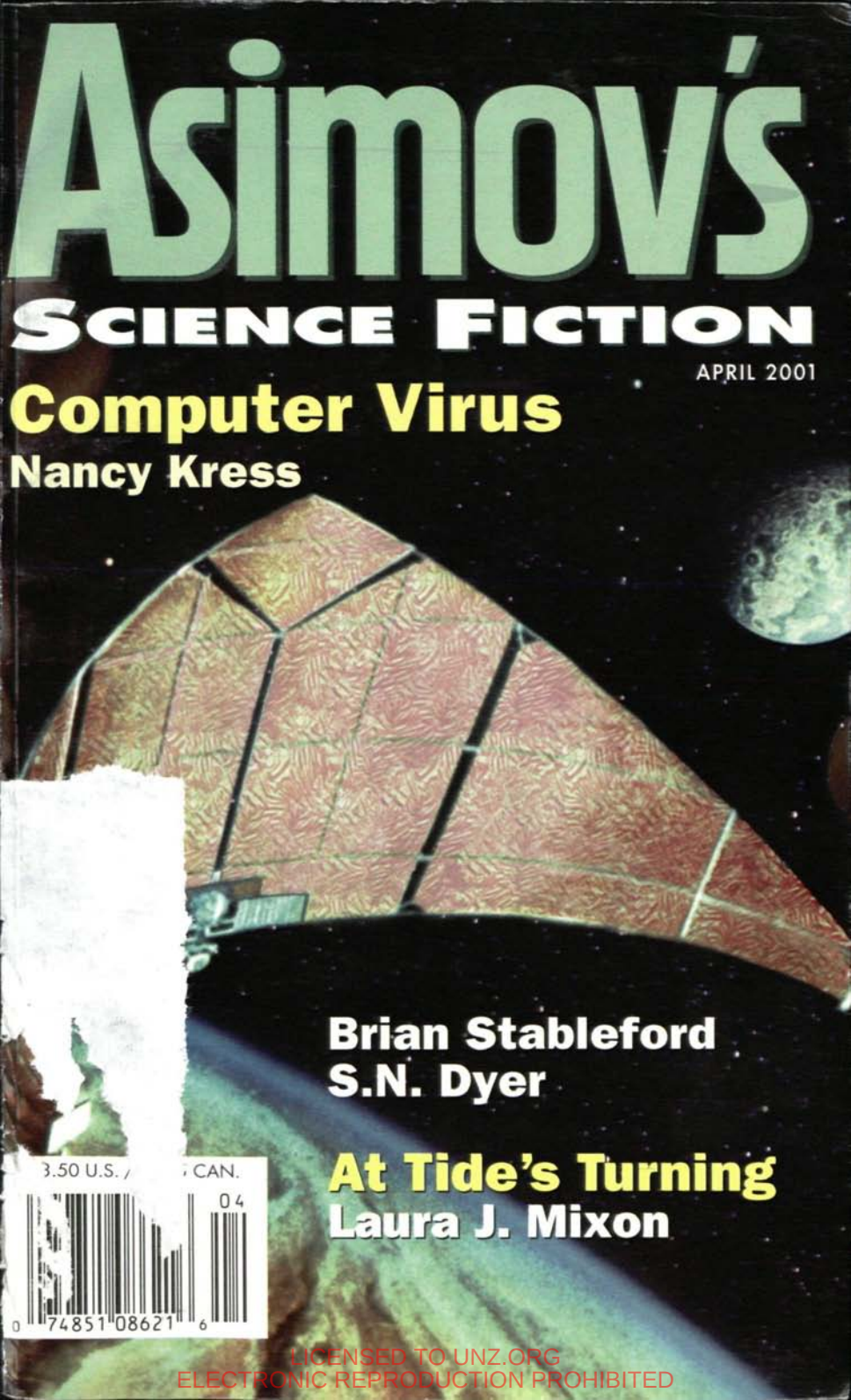

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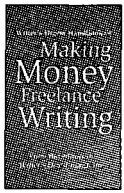

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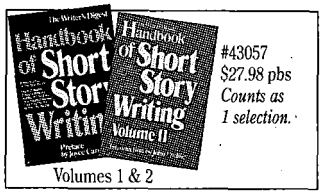

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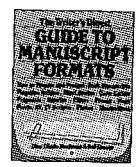

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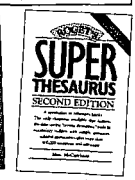

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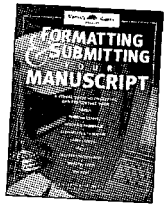

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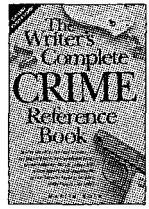

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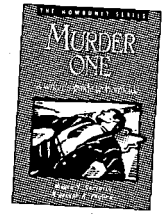

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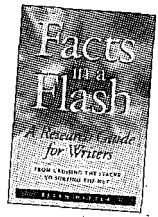

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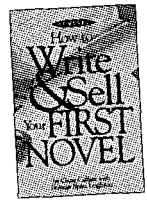

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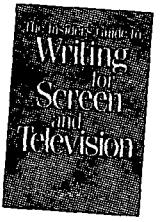

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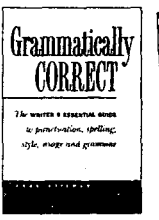

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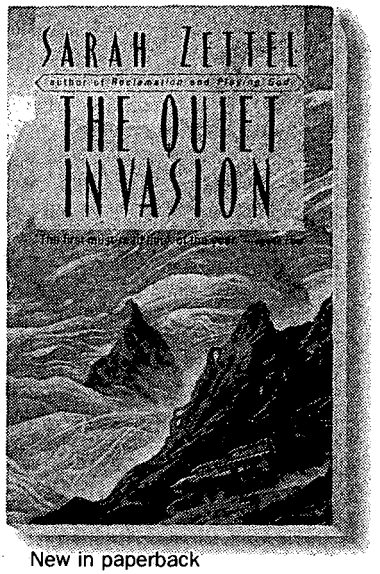

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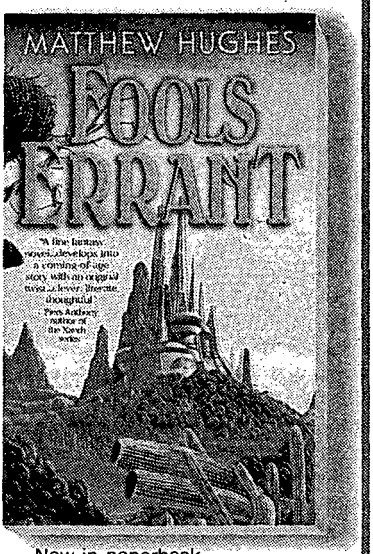

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REFLECTIONS

by Robert Silverberg

THE NEW WAVE (TWO)

Last time I told how the radical social and cultural changes of the 1960s led to an upheaval in the once quite conservative world of science fiction, a revolution that came to be known as the period of the New Wave. I noted that it began as a cohesive and self-conscious literary movement that centered around the British magazine *New Worlds*, edited by Michael Moorcock, and that by 1967 the writer and critic Judith Merril had begun to praise its achievements in her monthly book column in *Fantasy and Science Fiction*.

Merril referred at first to the Moorcock movement as TNT, "the new thing." But it was, I think, Christopher Priest—an important young writer then, but only a peripheral figure in the Moorcock circle—who borrowed from the French cinema the term "new wave," a reference to the radical films of directors like Godard and Truffaut, and applied it to the new British science fiction. The term stuck, and spread quickly to the United States, where science fiction was already in the throes of its own New Wave movement.

There was never anything here as formally organized as was the Moorcock group over there. Instead, the changes in American SF were matters of individual decisions about how stories should be told, coupled with a willingness on the part of some editors and publishers to relax formerly stringent and limiting notions of what the SF readership would be willing to accept.

That willingness to take chances—on the part of Betty Ballantine of Ballantine Books, Avram Davidson of *Fantasy and Science Fiction*, Frederik Pohl of *Galaxy*, and even so conservative a figure as Donald A. Wollheim of Ace Books—made the changes possible. The surprising figure was Wollheim, who found much of the new science fiction personally repellent, but set up a separate publishing line within his company, the Ace Specials, run by his young assistant editor Terry Carr, as a vehicle for New Wave novels.

What set things going over here was the arrival of new young writers for whom the use of modernist literary techniques and real-world themes was a natural and intuitive choice, rather than any conscious attempt to break away from established SF forms. Their work, fresh and vital, made an immediate appeal to jaded readers and editors alike.

One such writer was Samuel R. Delany, black and bisexual, who came out of an entirely different world from that of Heinlein and Asimov and Clarke. The Delany space-adventure novels that began to appear in 1962 were like no space-adventure novels anyone had ever seen before. Judy Merril, reviewing his *Einstein Intersection* of 1967, called it "a dense mixture, heavily concentrated, double-distilled. . . . It is also and absolutely a story about where-it's-at, right here, right now." His books began to win awards and gain imitators. A visit to England brought him into contact with the Moorcock group and he became a significant bridge figure between American and British SF.

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Roger Zelazny, whose career began about the same time, had (unlike most SF writers of earlier days) a deep knowledge of classical and modern literature, mythology, and psychology. Beginning in 1963 with the startling novella "A Rose for Ecclesiastes," followed quickly by such novels as *This Immortal* and *Lord of Light*, he unleashed what amounted to a one-man literary revolution. Tom Disch, another twenty-something with a background in avant-garde literature, chimed in with *The Genocides, Camp Concentration,* and a host of dazzling short stories that no SF magazine of a decade earlier would have published. Norman Spinrad's novel *Bug Jack Barron,* pungently obscene, drew on the dark new world of mass media and political corruption for its subject. And then Joanna Russ, R.A. Lafferty, Carol Emshwiller, David R. Bunch, and a host of others suddenly were publishing a kind of science fiction that owed more to Borges, Kafka, and William Burroughs than to the star writers of John W. Campbell's golden age of science fiction.

In this time of exuberant ferment, some of the older SF writers, bored with the constraining nature of the old SF, were taking the opportunity to reinvent themselves as well, often without realizing that they were affiliating themselves with something called the New Wave. They simply wanted to try something new. Harlan Ellison, who had written a great deal of undistinguished SF in conventional pulp modes, abruptly broke loose with such startlingly surreal stories as "I Have No Mouth and I Must Scream" and "The Beast that Shouted Love at the Heart of the World," which won him an entirely new reputation as a literary innovator. My own career followed a similar path, from straightforward magazine fiction to such novelties as the novels *Thorns* and *Son of Man*

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and experimental stories by the double handful. John Brunner, a British writer whose career was largely centered in the United States, turned away from paperback space-opera to write such unusual books as *The Whole Man* and the gigantic, astonishing, Hugo-winning *Stand on Zanzibar.* Fritz Leiber's fiction, always dark and strange, grew darker and stranger. So did that of Philip K. Dick and Philip José Farmer.

The advent of anthologies of original fiction in book form further liberated the writers from the old pulp-magazine formulas. A horde of new markets clamored for fiction in the new mode. Damon Knight's *Orbit* series, which began in 1966, was avowedly literary and experimental in policy, and writers like Richard McKenna, R.A. Lafferty, and Gene Wolfe flocked around. Terry Carr began *Universe*; I edited *New Dimensions*; Samuel R. Delany brought forth four issues of *Quark,* probably the farthest-out anthology of all. And Ellison edited the massive *Dangerous Visions,* a comprehensive collection of new stories in the new rebellious manner, with contributions by Delany, Aldiss, Ballard, Brunner, Spinrad, Dick, Farmer, and many others who were at the center of the current scene.

For a while it seemed as if the revolutionaries had carried the day. Advocates of the new fiction—Ellison, Brunner, Delany, Zelazny, Silverberg, Farmer, Aldiss, Moorcock—began to win Hugo awards right and left, and then Nebulas when that award was instituted also. Many of the writers who were just beginning their careers—James Tiptree, Jr., John Varley, Barry Malzberg, Gardner Dozois, Michael Bishop—tended to write in what could be called New Wave modes. There was open mockery of the old-fashioned, "obsolete" fiction of Heinlein, Asimov, and Clarke at science fiction conventions. The new stuff monopolized the bookstores.

The reaction on the part of Old Wavers was not long in coming. In his 1971 history of science fiction, *The Universe Makers,* Don Wollheim complained that "the readers and writers that used to dream of galactic futures now got their kicks out of experimental styles of writing, the free discussion of sex, the overthrow of all standards and morals (since, if the world is going to end, what merit had these things?)" A few years later Lester del Rey, once a young firebrand himself but now an impassioned advocate of traditional storytelling modes, described the New Wave by saying, "The pulp and adventure backgrounds of science fiction were largely rejected. So-called experimental writing—derived, of course, from the avant-garde experiments of forty years before—was regarded as somehow superior, and social consciousness of a sort was more important than extrapolation." The breaking of taboos, del Rey noted, had become a goal in itself, along with the "daring" use of four-letter words, but nobody, he insisted, seemed interested in genuine examination of significant ideas. The diminutive del Rey was often seen defending these positions at the top of his lungs at the science fiction conventions. Other pillars of the field were equally vehement in their contemptuous denunciations of New Wave fiction and attitudes.

Then a curious thing happened to the revolution. It went away overnight when the publishers started noticing that people had stopped buying the new kind of fiction.

SF readers had eagerly embraced the novelties of the late 1960s and early 1970s. But after a time they discovered that a lot of the new stories were incomprehensible; some were offensive in tone or concept;

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and most had turned away from the grand themes of the exploration of time and space that had drawn science fiction readers to science fiction in the first place, in favor of "inner space" concepts hard to recognize as SF at all. The new anthologies folded; the experimental novels started to go out of print; in Great Britain, *New Worlds,* where it had all started, ceased publication after years of steadily dwindling circulation; the Hugo and Nebula awards began to go to fiction of the more conventional kind by writers of the old school, works like Arthur Clarke's *Rendezvous with Rama* and Isaac Asimov's *The Gods Themselves.* Many of the leading writers of the new SF walked away from the field in despair as publishers lost interest in their work; some never came back.

So it was all for nothing, the glorious New Wave revolution of 1965-72?

No. Those years were a time of riotous excess in science fiction, as they were in European and American civilization in general, and, like most literary revolutions, the New Wave produced much abominable nonsense along with a few genuine classics. In their reaction against the staleness of the older fiction modes, the New Wave writers sometimes went much too far over the top into wayward and willful self-indulgence, as even some of them will admit today. But one can hardly say that it was all in vain.

The long-term effect of the dizzying New Wave period was a grudging acceptance of the fact that science fiction could and should be something more than straightforwardly told pulp narrative involving a conflict between generically characterized stereotypical figures that led inevitably to the triumph of good over evil. For the first time it became permissible to write complex narratives about complex people who were dealing with complex speculative situations. Fullness of characterization, emotional depth, and richness of prose would no longer be seen as something for a writer to avoid, as generally had been the case in SF in the magazine-dominated era of the first half of the twentieth century.

No one had any illusion, after the collapse of 1972, that this kind of work would win as wide a readership as the two-fisted tales of the spaceways, the Tolkien imitations, or the media-related spin-off books that the mass audience wanted. Mass audiences want prefabricated fiction; that will never change, and it was naïve of us back in the New Wave times to think it would. But the deeper SF could win *enough* of an audience—intelligent, demanding, intellectually curious—to hold its own in the marketplace. And so the New Wave period was an evolutionary crisis, a collision of old and new that led to a synthesis of both in which the virtues of each were melded into a vital new kind of SF that abjured the formulaic nature of the earlier stuff and the worst excesses of the New Wave.

But for the battles of the New Wave, such books as Kim Stanley Robinson's Mars trilogy, William Gibson's *Neuromancer,* Gregory Benford's *Timescape,* Gene Wolfe's *New Sun* tetralogy, Connie Willis's *Doomsday Book,* and on and on up to last year's Nebula-winning Octavia Butler novel, *Parable of the Talents,* might never have been written. The literary warriors of thirty years ago created a climate in science fiction that made the publication of such books possible, even if they would never attain the sales figures of the latest *Star Wars* novelization.

It was a battle worth fighting. I'm glad I was there. ❍

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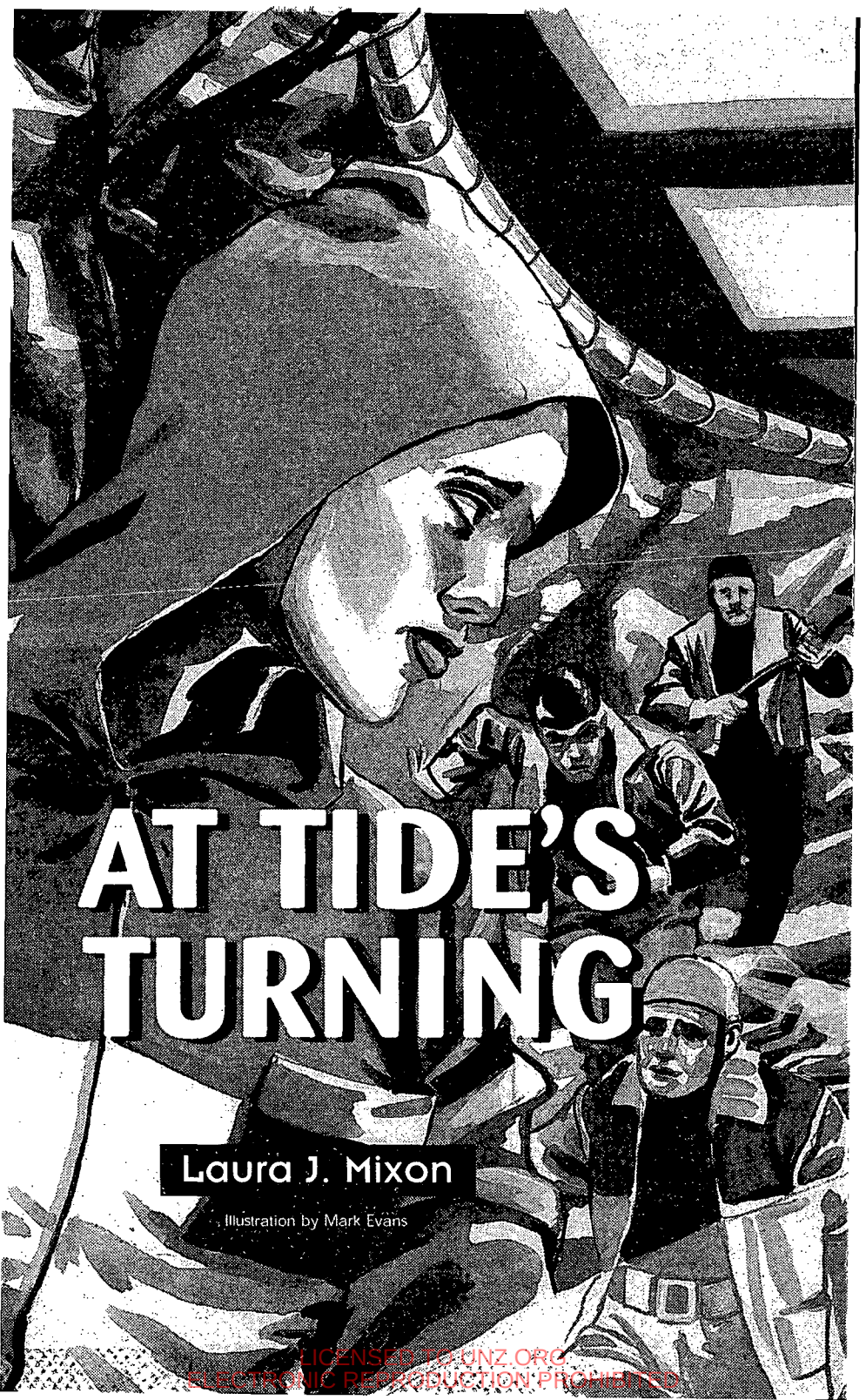

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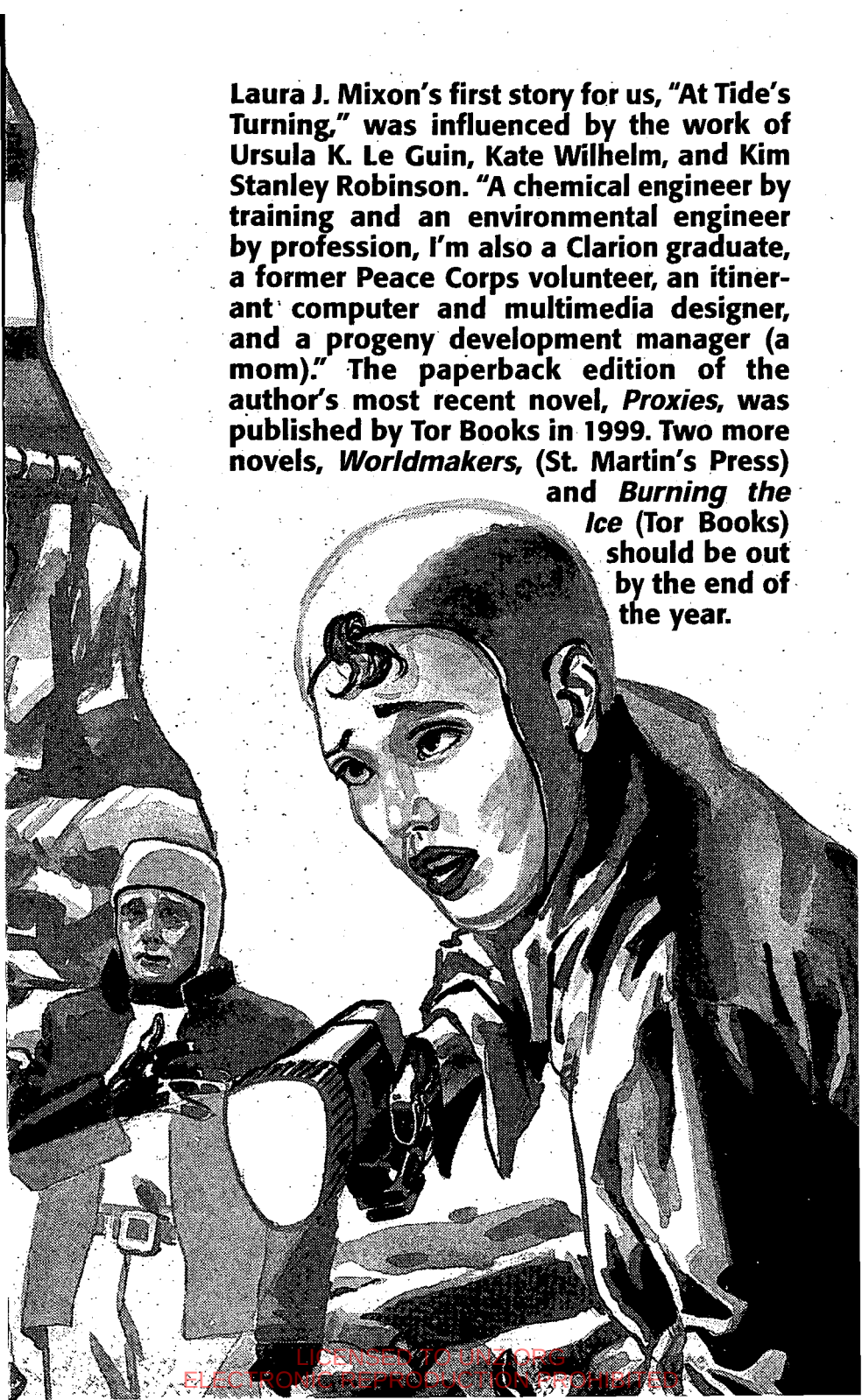
Laura J. Mixon's first story for us, "At Tide's Turning," was influenced by the work of Ursula K. Le Guin, Kate Wilhelm, and Kim Stanley Robinson. "A chemical engineer by training and an environmental engineer by profession, I'm also a Clarion graduate, a former Peace Corps volunteer, an itinerant computer and multimedia designer, and a progeny development manager (a mom)." The paperback edition of the author's most recent novel, *Proxies*, was published by Tor Books in 1999. Two more novels, *Worldmakers*, (St. Martin's Press) and *Burning the Ice* (Tor Books) should be out by the end of the year.



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"People can't die along the coast except when the tide's pretty nigh out. They can't be born unless it's pretty nigh in—not properly born till flood. He's a-going out with the tide. . . . If he lives till it turns, he'll hold his own till past the flood, and go out with the next tide."

—Mr. Peggoty to David Copperfield, from David Copperfield *by Charles Dickens (1850).*

After breakfast that morning, Manda CarliPablo headed to her work chamber to check her marine-waldos' night's work. The chamber was an ugly, rock-hewn room with fluorescent lighting and a thatch floor, with what looked like a hiker's daypack hanging from a rod in the room's center that rode across a wire web suspended just below the rough ceiling.

Decked out in her livesuit and -hood, Manda hooked the livepack onto her yoke's leads, slipped on the pack's straps, and then buckled it around her chest. Her liveface appeared before her as she did so, rendered on her retinas by lasers built into the specs set in her livemask. Glamour filled the room, a glowing sphere that defined her projection pod, and a host of 3-D icons appeared: shiny, translucent satellites locked in Manda-static orbit.

First, Manda touched her communications-cube, and it expanded into a thicket of geometric shapes. She checked her mail and messages. Luis-Michael hadn't sent her his new seismic data yet. So she folded the comm-cube up and started calling up her marine-waldo data. It blossomed around her in glistening bouquets and thickets of numbers, charts, and graphic landscapes, and she began to sort it all. Her hand-crafted fleet of eight marine-waldos, the *Aculeus* series, collected a lot of information, and she had a lot of data to get through since she had taken the evening off yesterday.

But it wasn't long before fingers of cold seeped in, disrupting her concentration. Beneath all the protective layers Manda had on—layers of plastic, organic, and metallic fibers, one after another till she could scarcely bend elbow or knee—she shivered, nicking virtual icons with cold-clumsy hands and elbows. Data strands fragmented and cascaded around her down the inner boundaries of the projection pod like ice crystals flung by a storm.

"Shit."

With a sigh, suppressing both her frustration and the shivers, she recovered the data, reconstructed it, and started again—dancing her marine-waldo control dance, working her fingers, arms, legs, and torso to guide her fleet of machines across the dark, cold floor of the ocean, to read its secrets with their instruments.

She was the colony's best waldo pilot. The best. Amid the billions back on Earth, how could any single human presume to be the best at anything? For that, at least, she was glad to be one of the handful who lived on this freezing, barren world. She hadn't lost a machine yet, in almost six seasons of piloting in some extremely dangerous environments.

Manda's siblings Arlene and Derek, the oldest set of twins of the CarliPablo nineclone, had suggested the ocean search project to Manda, while they and the rest of the clone geared up on Project IceFlame, the terraforming project. Whatever secrets lay beneath Brimstone's icy crust had stayed hidden ever since the colony's inception eighteen seasons before. They knew little about this world they inhabited: Brimstone, the biggest moon of the gas giant Fire.

When Derek and Arlene had suggested it, the assignment had seemed ideal. Manda hadn't been especially interested in attempting a collabora-

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tion with the rest of her much more experienced, tightly knit sibling group—even if it would have put her at the controls of the winged waldos that would shortly be strafing the methane-laced ice at the poles, putting carbon dioxide and methane into the air to start a cascade of global warming and make this moon more than marginally habitable.

But was this really any better? All she was finding down in the ocean depths was dark and cold, and she'd had her fill of those. At least her prior assignments—flying the jet-waldos up to the poles, and using land-explorer equipment to take ice and air samples there—had turned up interesting data to analyze. Even her first assignment, driving an archaic and clumsy tractor-waldo across the rotten tropical ice floes, mapping the myriad island chains down there, struggling to avoid being thrown into the brine by Brimstone's violent and chaotic tides while looking for signs of volcanic activity, beat this endless, oppressive nothingness.

She was a woman of planetshine, of air currents and ice fog and indigo sky. Out in the harsh, rock-cold winds—in air so thin that a brief walk *in corpus* left her panting and so frigid it burned the sinuses even through her fur-lined parka hood and nasal filters—the cold didn't bother her quite so much. In her aerial and terrestrial waldos she could outrun it . . . or so she pretended. Down here in the ocean there was nowhere to run. The chill pressed in all about. Thousands of tons of water and ice lay overhead. Even the sounds were oppressive, the gut-deep groans of shifting floes carried to Manda's detectors across thousands of kilometers of gelid liquid: groans as deep and determined and agonized as those she'd heard some anonymous woman in labor make once, in a medical documentary. As if the world itself were trying to give birth.

And the dark, too, oppressed. Her fleet of marine-waldos had computer-enhanced vision; their visuals swirled with false-color images. But it was all unreal, no different than the hallucinations that swarmed behind her eyelids while she lay alone in bed at night—shivering, sweating—knowing that nobody gave a fuck about her and that she was going to die.

Her chest had grown constricted; through the pores of her livemask, she gasped for air. With a pirouette that bordered on panic and a set of finger flicks on the translucent control icons that orbited her, Manda retreated from the waldo she rode—she wadded the whole thing up, shrinking its inputs till it was merely a shining ball of reduced data in her hands, and set it loose to float amid the other balls of compressed data at waist level. This took only a second to do. Then, with a word or two, she adjusted the livesuit settings, and bent over till the pressure eased.

Nerves, that's all, she told herself. She touched a different waldo's commandshape and the dodecahedron grew till it swallowed her, infusing her with its sensate data.

Maybe, she thought, calmer now, as a current lifted her marine-waldo, *Aculeus Quinque,* over a rise blanketed in faint, neon-green rocks—as she scanned the ocean floor with infrared skin sense and magnified-light eyes and sonar ears, as she tasted the ocean currents with her waldo's thermocouples and chemical composition detectors—*maybe it really* is *time for a job change.* Moss or bamboo harvesting, polar duty—judah shit, even baby-tending—would be better than this endless, oppressive dark! (Okay—maybe not baby-tending.) Maybe Teresa was right, and she should join the terraforming effort.

But if there really *were* vents down here, it'd change everything. All this

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work would have been worth it. She just didn't know if she could keep at it much longer. The work made her feel cold—oppressed—even more isolated than she already was.

It slowly dawned on her that she shouldn't be this cold—not *this* cold. She minimized the commandball again and then disconnected herself from the livepack that hung suspended in the middle of her projection pod. All her command-, program-, and databalls shrank, flattened, and moved toward the center of her vision, and the hazy boundaries of the light-sphere that defined her projection pod vanished.

Her older twins, Teresa and Paul, the youngest pair of the CarliPablo clone after Manda, passed by the doorway as Manda pulled off her livemask and tam.

Teresa and Paul were both tall and muscular, with smooth, almond-dark skin and yellow-green eyes, and kinky, ginger-blond hair—their faces and bodies an identical, exotic mix of African and Scandinavian features. The bristles of Paul's short hair stuck up through the mesh of his livehood; Teresa's hair was longer, pulled back in a severe ponytail pressed flat under the translucent mesh of hers. Otherwise they were the exact image of each other—and of Manda too, other than the eight seasons of age they had acquired that Manda hadn't yet. Their livesuits, or what she could see of them, protruding from the sleeves and necks of their cable-knit sweaters, glistened on the backs of their hands and on their cheeks and foreheads like a film of mother-of-pearl.

"Talking to yourself again?" Teresa asked with an arch smile. Manda realized that she'd been vocalizing her unhappiness. And as usual, Teresa's teasing stung, probably more than she intended it to. It resonated with insults others had leveled at Manda recently, implying that there was something wrong with her for being a singleton. As if it were her fault somehow that her brother had died, shortly before they were scheduled to be decanted, twenty-one seasons, or earth-years, ago.

"I'm trying to work. Leave me alone."

Teresa's expression went flat and angry. Paul pointed a finger in Manda's face. "Lay off my sister."

He followed his vat-twin away.

"She's *my* sister, too, asshole," Manda said to his back. Then regretted her testiness. *Warm it up a degree or two, Manda. Your clone is just about the only friend you've got.*

This irritable back-and-forth between her and Teresa-and-Paul was a stupid pattern, but one Manda seemed helpless to change. From childhood, when Teresa and Paul were adolescents and Manda was "the baby," they'd always fought too damn much. Teresa was always provoking her, scolding or teasing—and Manda usually insulted her in response. Which invariably brought Paul to Teresa's defense.

Round and round we go, Manda thought. She'd have to apologize later.

Manda watched Paul catch up with Teresa, down the corridor: watched them walk away, fingers loosely interlaced.

Vat-mates. Rarely apart. Always there, an extension of each other—a remote limb, another self—since before awareness stirred in their cerebral cortices, before their nerve endings began to form and send signals to their nascent brains.

Self and other: the boundaries blurred, between clone siblings. Especially you and your vat-mate. Your vat-mate was part of you. When one died, the

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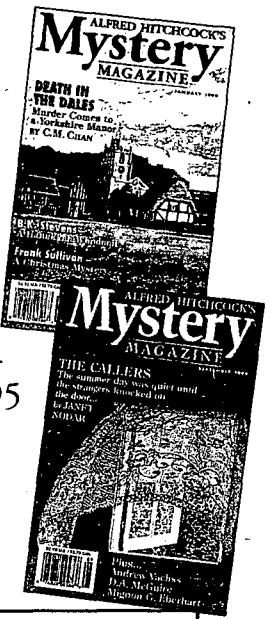

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other committed suicide shortly thereafter. Almost without exception. No point in going on, when half of yourself had been amputated.

Or so she'd been told. Manda wouldn't know. Her vat-mate had died as a fetus, shortly before they were scheduled to be decanted, back on the starship *Exodus* twenty-one seasons ago, as they neared this solar system. An accident; equipment failure or something.

This kind of thing happened a lot. All the machines were ancient, built back on Earth long ago. And even though they'd been designed for longevity in severe environments, and even though Manda's people had learned how to fix just about anything, entropy always took its cut. It was pure luck that Manda herself had survived.

She remembered none of it, naturally. She'd always been alone. She was used to it.

She smiled at the retreating figures. *You'll never know the freedom of being a single,* she thought. Except that it wasn't joy that coursed through her, now, but a bolt of fierce hatred, as she watched their casual closeness: so much a part of their world they would never even know enough to take it for granted.

A wave of nauseated guilt followed. Without her clone, she had nothing. Teresa, especially: she was the only one who'd ever stuck up for Manda, when the other kids had tormented her for being a single. (And then turned around and demanded to know what Manda had done to provoke them—but hey, it was more than anyone else had ever done!)

Then Manda noticed the rock wall, which was beaded with frozen condensate.

Frozen?

The readout above the thermostat on the wall read two degrees Celsius; that couldn't be right. Striding over to the wall, she ripped off a fleece-lined shell and nylomir mitten and her liveglove and touched the wall's white, chalky surface with her bare left hand. Ice cold. Sticky-cold, as the sweat from her fingertips froze. More like minus fifteen. The heaters had failed, again. No wonder she was so cold.

With a sigh of disgust, Manda recoiled her short, frizzy braid. She pulled the cool, slick-soft mesh of the livehood down over her head and face again, dragged the tam's cuff down over her ears, and plugged back into the livepack. The large sphere of soft light reappeared around her. With her right, swathed hand she stabbed at a shiny icon that now hovered at shoulder height, which solidified as she focused her sight on it.

"*Damn* you, ObediahUrsula!" she snapped at the round young face that materialized. "I can't work with the heaters failing all the time!"

ObediahUrsula's brow puckered and his eyes widened. So young. What was a child doing in charge of something as critical as the heaters?

"It's, it's just that the thermostats are—"

The words darted out of Manda's mouth in explosive puffs, like little ice daggers. "Don't. Give. Me. Another *fucking* sob story about equipment breakdown! Just *fix* it. If I lose a waldo, I'm going to put your name down as the cause!"

She stabbed the com icon off in the midst of his reply, and rubbed her hands over her painfully spasming stomach. A knot in her throat formed, swelled, threatened to burst.

"Goddammit." She swallowed the knot, washed it down with a dose of anger. "Damn it to hell."

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Someone passing by in the corridor glanced in at her and shook his head in disapproval. PabloJebediah: one of Jack and Amadeo's younger sibs. Jack and Amadeo, along with Arlene and Derek and the senior twins or triplets of three other clones, ran Amaterasu's governing council. And, Manda remembered belatedly, PabloJebediah and ObediahUrsula were closely allied. Manda had probably just disrupted some sort of delicate, inter-clone power balance, or given Derek and Arlene some kind of coup-related headache. Too bad. She glared at him until he went away, then pulled her livehood back over her head, adjusted her specs and mic, and hooked back into her livepack. Her data- and commandballs reappeared, within the confines of her sphere of light.

All right, she admitted to herself. *It isn't ObediahUrsula's fault the heating systems are failing. But if I didn't yell about it, nothing would get done, and we'd all freeze to death.*

She reconsidered and started to disconnect; she needed to calm down. She couldn't work when she was this upset. But a glimmer in one of the data-globes at waist level caught her eye. Probably nothing—another false alarm; *Aculeus Septimus*'s visuals might need calibrating again.

Or.

Maybe this time it was the hydrothermal vent she was looking for. The place where, if this frozen, forsaken pissball of a world had any remnants of life left, it would probably be.

Yeah, right. Shaking her head at her own optimism, Manda reached out for the little sphere, which showed a snippet of ocean floor with a bit of flickering red in it.

She spent the rest of the first-watch work shift trying to figure out what was going on with *Aculeus Septimus*. Hours, and countless tedious cross checks and equipment calibrations, later—as she'd expected—the temperature anomaly turned out to be a false reading. *Aculeus Septimus,* which had reported the last two anomalies, was malfunctioning again. Time to haul it in for a tune-up. *Or better yet,* she thought irritably, putting away her icons, *maybe I'll just junk it.*

Manda had her own little space, separate from the rest of her clone. It wasn't supposed to be like that, but she'd held out against all the recriminations and insinuations, back when, and eventually people had stopped making a fuss about it. She woke up from her first-watch sleep to find Paul and Teresa at the craggy entrance to her nook.

"Lights up," she said, sitting. A bulb burned out with a flash and a pop. Manda swore. Finding a replacement was going to be tough. She wrapped the fur about herself and eyed her older siblings in the dim light. "What's going on?"

Paul held out a data crystal, which she took. "Here's some stuff Arlene wanted you to look over," he said. "Inventory and loading schedules for Project IceFlame," Teresa added. Manda was going to be their primary coordinator Amaterasu-side, once the terraforming team headed for the poles. Paul said, "They'll need you in Stores tomorrow, to double-check everything."

"All right." She stood and tucked the crystal into a pocket of her pullover, which hung on a hook by the head of her sleeping mat.

But the data could just as easily have been transmitted online. Something else was up.

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Their gazes pressed on her back. Ignoring them, she triggered her livesuit's don-routine and stepped into the center of the suit as footprints formed in it. The livesuit rippled up her form like liquid metal. She pulled her long johns on over it, then lowered the yoke over her head, plugged it into her livesuit, slid on her gloves, and fitted them to the sleeves' leads. Finally she turned with an exhalation, bracing herself.

"Go ahead and break it to me," she said.

Teresa started: "We want you to—"

"—stay with us tonight," Paul finished. "For a while."

"We're holding a covalence ceremony," Teresa said. Which meant someone had a new exo-bond—a sexual pairing.

It had to be *really* important for them to be here. She'd refused to participate every single time they'd asked in the past six seasons, since her disastrous experience with JebediahMarshall. Curiosity overcame her initial impulse to simply refuse and kick them out.

"Who?"

Teresa and Paul exchanged a look. "JennaMara," they both replied. One of the other clones on the governing council.

Manda's eyes widened. "For real?"

"For real."

Wow. Major coup is in play, then. She started to ask, *which ones?* Paul anticipated her. "Janice, on our side. You know Charlotte?" Manda shook her head. She didn't really know JennaMara, except for its prime, Lawrence. He was okay.

Manda worried a hangnail. "How is Farrah?" Farrah was Janice's vat-twin.

"She's dealing with it," Paul said, tersely.

About six seasons ago there'd been a pairing between Teresa and a ByronMichael. It had been really hard on Paul. The exo-bond had been Teresa's first—and only—serious one. Paul had taken all his anxiety and anger over it out on Manda when she'd refused to participate in the covalence ceremony.

Teresa had somehow gotten Manda off the hook with ByronMichael and Paul, and the exo-bond with ByronMichael had eventually dissolved. But Teresa had extracted a promise from Manda to attend the next covalence she asked her to, and Manda had agreed. Until now, Teresa had been careful to avoid calling Manda on it—which had only increased Manda's indebtedness to her.

"I hate this," Manda said. She couldn't get away with a flat refusal. Still, it was worth a try. She gave Teresa a pleading look. "Can't you—"

"No." Teresa's tone was sharp. "Charlotte has asked for you."

Manda was surprised. "She did?" Paul and Teresa both nodded. "Why?"

"We don't know," Teresa replied, "but JennaMara wanted us *all* to be there."

"JennaMara really put its coup on the line for Project Iceflame," Paul added.

"So *that's* what this is about."

Paul frowned. "It's not just that. Don't be so fucking cynical, Manda."

"Janice really has a thing for Charlotte," Teresa interjected. "She needs you to help make it okay." Paul went on, "If you're there, it'll mean major coup for us. Everybody knows—"

—how you are. Manda heard it without him saying it, and glared, but he stared steadily back.

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"And Farrah needs you," Teresa said. Paul nodded. "She's taking it hard."

"She is?" Manda felt a twinge of sympathy. It hurt—she was told—when your vat-mate took a lover. The covalence ceremonies were supposed to salve anxious feelings and resentment between the unpaired vat-siblings on each side.

She thought, *at least Farrah* has *a vat-mate. She doesn't give a shit about me. None of them do.*

Try not to be a bigger asshole than you can help, Paul's gaze said. And, *you owe me,* said Teresa's. *You promised.*

Manda's heart fluttered painfully. No clean way out.

It was just a formality. It wouldn't take too long. She'd participated once or twice when she was younger, before she'd worked up the nerve to refuse. And at least Janice was showing good taste.

Manda sighed heavily. "All right. This once."

Relief spread onto their identical faces. Teresa hugged her and Paul gave her shoulder a squeeze.

"Thanks," they said in unison.

"When and where?"

Paul said, "Arlene has prepared—"

"—a meeting space on the Mound," Teresa added. "See you there," they both said, and finished, as Manda opened her mouth to ask when, "at twenty-seven o'clock tonight."

Manda arrived a few minutes late to the IceFlame project meeting.

"Well, this is it," Arlene was saying, as Manda entered. "The council has settled on a final launch date for the polar expedition."

The entire project team was there. Manda's clone sat in front, seven of it, not counting Arlene and Manda: three men and four women. The others were all at least eight seasons older than Manda. At sixty seasons, Arlene and Derek were the eldest. Several other clones were also present, including those who, like Manda, would be providing Amaterasu-based support.

"We ship out in eight days. I've got everyone's assignments."

An excited murmur broke out.

Eight days? Manda felt a pang of anxiety. She hadn't expected things to happen so quickly.

She seated herself next to Teresa and Paul, and listened with perhaps half an ear while Arlene went over the initial setup stages of the project. Her role in that would be minimal. The other attendees were more attentive as, with an economy of word and gesture cultivated by genetics and upbringing, honed to a high gloss over decades of working together, her siblings went over each phase of the assignment with the other team members.

Project IceFlame had two main thrusts. The first, which had been going on for several seasons, was a massive drilling effort: at twenty-eight locations strategically placed around the moon's surface—primarily in the upper latitudes, where most of the moon's carbon dioxide was stored, in deadly, smoking-cold glaciers of CO_2 and methane-hydrate ice—drills would pierce the crust and tap into the magma, creating vast fields of lava "irrigation." These would serve as the ongoing energy source to keep Brimstone's many fields of methane hydrate deposits burning, with fleets of air-avatars controlling the intensity and spread of the burns.

During the town meeting last month, at which the colonists had debated whether to carry on with IceFlame, those opposed had pointed out the risks

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of piercing the moon's crust. There was a small risk it could set off a series of major quakes that could jeopardize the colony, and a greater risk that their precautionary tamps would fail: that the terraforming fires would burn out of control, put toxic amounts of carbon dioxide into the air, or melt the ice caps to the point that Amaterasu would be inundated.

It had been decided that the risks were worth it. Their equipment was slowly breaking down around them; their population was dwindling, as dozens of colonists a year died of exposure or cold-related accidents. They needed to get out of these caves.

"Bart and Charles will give us a status report on the magma drilling," Arlene said. The middle-aged CarliPablo twins came to the front of the room.

"The first drill is scheduled—" "—to penetrate the crust and reach magma—" "—at 36 o'clock tonight," they said, trading off with such natural ease that it didn't matter who was talking. "The other twenty-seven should be breaking through the crust—" "—over the next six to eight days." "Any delays in drilling will result in a delay in the polar expedition's launch."

Others raised questions and brought up technical points; the discussion continued. As Manda watched her clone siblings and the other teammates, a sour feeling settled into the base of her gut. Once they left, she'd be all alone among the others, not one of whom cared whether she lived or died.

Well, it was too late to change her mind about joining IceFlame now. Even if she'd wanted to.

Gift. I need a gift. That evening after her second-watch work shift, while hurrying down through the colony tunnels from her workstation to the Mound, she remembered and reversed her direction. It had to be something valuable. Something with personal meaning.

At her cubby, she picked hurriedly through her few belongings, set in the niches around the small room's perimeter. Then she spotted her rock collection. Perfect. She'd gathered all sorts of interesting specimens over the years.

Manda picked up a geode she'd found once. Its crystal interior caught the light in many small, rosy prisms. She remembered how when she'd broken the egg-like rock open, she'd exclaimed with delight. How could such a rough, ugly exterior hide such inner beauty? She'd spent many a minute gazing at it, imagining she had discovered a tiny fairy city in its depths. She loved it.

Then there was her lichened shale. She fingered the pale, grey-green, lacy growth that covered the rock, and bits of lichen and rock flaked off onto her fingers. She rubbed her fingers together, smelled its dust: imagining the rich scent of topsoil the lichen was building, molecule by molecule.

As a child, during a stint helping the herders with their reindeer, Manda had discovered a small outcropping blanketed with the stuff. The lichen growth was a volunteer—not planted by the colonists and not expected. Everyone had gotten excited. It was one of the first indicators that their early terraforming efforts were taking hold. The geologists she'd reported her find to—LuisMichael: Jim, Brian, and Amy's two older sisters, back when they were still alive—had given her this small piece in thanks.

It was that incident as much as anything else that had filled Manda with a desire to explore this icy moon they inhabited. Though several efforts had been made to explore overland and aerially, the colony's early efforts to explore the ocean floor had ground to a halt, back when Manda was little,

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when the JebediahMeriwether twins had died. All kinds of wonders might await them. Even Brimstone-based life.

Manda hesitated, then put the lichened rock back onto her shelf and took the geode.

She didn't want to lose her lichen. The stuff was all over the place now, and the geode was her rarest and prettiest stone—unusual enough to buy a lot of coup at the upcoming ceremony. But to Manda, the lichen and the memory it stood for was worth more.

The Mound lay in almost the exact center of the great cavern that held Hydroponics and the bulk of the bamboo forest: the lowest inhabited level of Amaterasu.

The bamboo forest itself grew in a series of dozens of interconnected large chambers, each in different stages of growth or harvest. These crop chambers surrounded a single, vast chamber—the second biggest in all of Amaterasu, after Hydroponics—that had a naturally formed low hill in its center.

The eco-engineers had worked hard to grow a wild meadow and tree forest there, out of the barren, metal-salt-laden dust of Brimstone. And they'd been reasonably successful. Though marred in a few places by bald or sickly patches, in the main, it was a lovely spot: a big, gentle hill shot through with wandering stands of ash and birch and black spruce (albeit dwarvish and spindly compared to the majestic virtual specimens in their Earth archives), and covered with silvery, cold-resistant, drought-resistant, metal- and salt-tolerant grasses, spritzed with pink, gold, and white wildflowers, also resistant, which were pollinated by bees and butterflies.

The lights set way overhead created a shadowless twilight—a dim setting, which left enough light to see by but gave the nocturnal animals their time to come out of their burrows, to mate and graze and collect seeds. The acoustics were excellent here: bamboo leaves whispered; birds chirped and cats yowled; distant machinery in the hydroponics and machine-shop caverns echoed their arrhythmic, dissonant clanking; the soft lowing and yipping of the domesticated animals in their stables up and down the cavern walls wove a unifying harmony for the other sounds.

In the Mound's center lay the ceremonial circle where many of the colony's major fertility and harvest rituals were held. The circle was defined by a ring of carved stalagmites and rocks. She'd been told its design harkened back to some ancient sacred places on Earth. Some of the carvings were geometric patterns, while others sported an assortment of caricaturish faces.

From the forest's edge, Manda saw that everyone else from both clones was there: CarliPablo seated on the far end of the circle, and JennaMara, an eightclone, seated on the near side. Farrah and Janice both wore long white gowns, as did Paul and Arlene, and of Janice's clone, Lawrence's vat-mate Donald and Janice's two vat-mates: a man and a woman whose names Manda didn't know. There must have been a drawing to see who would be the main participants. Manda felt a twinge of gratitude that they had left her out of it. Her role would be minimal.

Teresa held bamboo clavés in her hands and one of Janice's younger siblings had a multi-reed flute. Stacks of blankets and large cloths lay around the circle, behind the main participants. Both clones had arranged themselves by age. Manda stepped between the tall stones and crossed over to where her siblings sat. As she passed around the outside of the circle, she

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overheard Bart and Charles whispering to Derek in excited tones, "Drill eighteen broke through, eleven hours early!" "Fourteen and one are scheduled to hit magma in the next few hours."

"Excellent," Derek replied. "Great news."

Manda pressed her hands on her stomach as another wave of anxiety hit, followed by anger at her weakness. *Stop being a wimp. You don't need them. You don't need anybody.* She just wished it were true.

"Any tremors?"

"A few small ones. Nothing serious so far." "We're keeping a close eye on things."

"Good. Good. . . . "

She passed behind Janice and Farrah, and then Paul, who spared her a rather curt nod (what had she done to anger him this time?), and sat cross-legged at the end of the line, next to Teresa. Janice was holding Farrah's hand but looking across at Charlotte, who gazed back at her as if no one else were present. Farrah's face was stony. Manda thought, *that's not an auspicious start.*

At a glance from Arlene, Teresa started a syncopated beat on her clavés. The wooden sticks clack-a-clacked a short, repeating pattern, while the JennaMara flutist played a cheerful little tune. Manda winced. JennaMara apparently didn't have much native musical ability.

Arlene, taking prime for CarliPablo, and Donald, acting as prime for JennaMara, both stood and came to the center of the circle. Arlene carried a huge, stemmed bowl of mead, and Donald carried a burning taper and a meter-long water-pipe filled with tobacco and cannabis.

Arlene held the cup up. "I-we bless the joining of Janice and Charlotte." Then she took a sip of the liquor and dabbed at her lips with a long cloth napkin she had draped over her arm. From his seated position near her, Derek mimicked her gestures in miniature, moving his lips in synchrony with her words. Manda was sure he wasn't conscious of it. None of the others ever were, either. She felt that familiar old pang of isolation.

Donald, an older man with black skin and white hair and a cordial gaze, lit the ceremonial herbs and sucked on the pipe till tendrils of smoke curled upward. The air above the water in the bulb filled with smoke. He lifted the pipe. "I-we celebrate this union of JennaMara and CarliPablo." Then he inhaled deeply. After this, he ground the taper out in the dirt and then exchanged the pipe for the stemmed bowl with Arlene, as twin streams of smoke trickled from his nose.

"My-our thanks to CarliPablo for this drink," he said, and took a deep draught of mead from the ceremonial cup. He coughed a bit, and wiped his mouth on his sleeve.

"And my-our thanks to JennaMara for this smoke." Arlene put her lips on the mouth of the water pipe and inhaled. Then they traded back. Donald brought the pipe of herbs over to CarliPablo while Arlene went to JennaMara with the liquor. Manda watched while Donald handed the pipe to each of her siblings. Her turn came last. Donald gave her a nod as he held out the pipe. She drew a deep breath, and coughed, as the cool, sweetish smoke scoured her throat and bronchia.

Arlene had finished sharing mead with the youngest of JennaMara, adolescent male twins perhaps fifteen seasons in age, who were avoiding meeting anyone's gaze. Manda guessed they'd never attended a covalence before; they were barely old enough. Children, for obvious reasons, weren't expected to participate.

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Now Arlene came across to Manda and knelt, putting the stemmed bowl of mead to Manda's lips. Manda took a big swallow, and managed to keep from sputtering as the liquid scorched her throat.

"Thanks," Arlene whispered, as she dabbed Manda's lips. *Thanks for coming,* she meant. The remark only annoyed Manda.

What the hell am I doing here?

If only she'd had the nerve to renege on her promise to Teresa. She didn't believe in any of this mystic shit. It was all a big lie. Nobody really cared about anybody. They just wanted her to pretend. Don't make a scene. Pretend to be like the rest.

The gift exchange came next. Manda presented her geode to the youngest JennaMara vat-twins, who thanked her nervously. One of them gave her a framed photo of a dog, and the other gave her a bamboo boothorn he'd made. She muttered thanks and tucked them into her pockets, but instead of sitting next to the young JennaMara twins, she went back over to her original spot, and ended up next to Teresa, who was chatting with her own JennaMara counterpart.

I'm acting like a nervous adolescent myself, she thought. *What's the big deal? They're certainly cute enough, and I could probably teach them a thing or two.* (Not that she was all *that* experienced.) But she didn't get up and go over.

Several more passes were made of liquor and smoke, and Manda was getting dizzy. The music seemed to be getting better. She listened for a moment. Yes. Definitely improving. But the rest of it still infuriated her. People were talking in whispers, laughing. Manda merely sat there, arms folded. The twins were eyeing her. She studiously avoided their gazes—looked instead at the glistening stalactites far overhead, and the bamboo stairways and bridges that conjoined the holes along the walls, along which distant human and animal figures moved.

Bowls of curried ox-steak with bamboo shoots were served with *mana* bread, and afterward more alcohol and smoke was dispensed. Some sweets went around. Manda relaxed a bit, and chatted with Teresa and Paul, and with the two young men, who had moved over at some point. They seemed nice enough, and eager to please. They made a big deal over the geode and asked her where she'd found it. She told them the story, and they shared anecdotes about their experiences upside.

After a while, Arlene and Donald called for everyone's attention. Janice and Charlotte came to the center and kissed each other, lingeringly. Everyone whooped and clapped. They looped strips of leather over each other's wrists. Meanwhile the other active participants stood up and came to the center as well. Everyone was a little drunk or a little high, or both, and their gaits weren't too steady—except for Farrah, who looked stone-cold sober, and a lot like she was going to explode.

I know just how you feel, Manda thought. But she didn't, really. She didn't have a vat-twin to be jealous over, and wasn't all that angry anymore. Just anxious, and—for some reason—sad.

Arlene joined Farrah's left wrist to Charlotte's right with the leather strap, saying, "CarliPablo embraces JennaMara through its member Charlotte. Share you-yourself with each of me-us as you have with one."

Donald JennaMara joined Janice's wrist to one of Charlotte's vat-mates', the male one. "JennaMara embraces CarliPablo, through its member Janice. Share you-yourself with each of me-us as you have with one."

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Next Arlene gestured at Paul. "Since Janice is a two-mate and Charlotte is a three-mate, Paul has agreed to covex with Martha for CarliPablo." She joined his left wrist to the right wrist of Charlotte's female vat-mate, saying, "CarliPablo embraces JennaMara through its member Paul. I-we share ourself with you-you through you-your member Martha."

The bindings were only ritual, and fell away as Charlotte reached up to kiss Farrah. Manda watched some of the tension leave Farrah's body as she released herself to Charlotte's passion. Everyone applauded and laughed. When the kiss ended, Farrah bowed her head, dashing away tears.

With a tender smile, Charlotte put an arm around her, picked up a blanket, and led her away from the circle. Janice watched them go with an expression of relief and approval. Then she kissed her own partner, Charlotte's triplet brother, while Paul kissed Charlotte's triplet sister Martha, and both couples got much appreciative applause. They also took blankets and left the circle.

More food, mead, and smokes went around. Manda got woozy. A while later, she found her head in the lap of one of the youngest boys. His twin was stroking her thigh while the first fondled her breast, smiling down at her. A very pretty young man, whose eyes were as dark and friendly as those of Donald. Still, terror lanced her, sharp and hard as a knife blade, dispelling the pleasant ache of desire low in her belly.

Shit.

She sat up and pushed them away, and staggered to her feet. Concerned and confused faces swarmed around her—*what's wrong? are you okay?*—as, swearing, she stumbled out of the stone circle and off into the bamboo forest.

Teresa came after her and grabbed her arm.

"You promised!" she said. Her speech was a bit slurred but her gaze was piercing.

"Leave me alone!" Manda threw off her grasp.

"You owe me this."

"I don't owe you a fuck with strangers! They aren't *my* exo-bond."

"You don't have to do anything with them. Nobody made you. But you shouldn't leave alone like this, before we do the wrap. It's rude."

Manda shook her head slowly, confused. She heaved deep breaths, trying to clear her head. Her heart was thumping, striving for her attention. Somewhere off to her left, one of the couples was engaged in lovemaking. Their moans and rustlings made her aware again of the ache throbbing low in her belly.

"I don't belong here," Manda said, wiping away tears. "This is hurting me." She grabbed Teresa's hand. "Please release me from the promise. Please."

Teresa glared at her, and snatched her hand away. She stalked back toward the circle, with a "Go, then," flung over her shoulder. Manda lifted a hand after her, then dropped it. She turned and made her sad and drunken way back to her cubby, where she relieved her unrequited desire with her fingers, thinking of those two lovely young men she couldn't bring herself to covex with.

She woke in the morning with a slight hangover. The prior night's events had taken on, mercifully, a dreamlike vagueness. The absence of her clone in the crowded, noisy mess hall at breakfast—they were probably hung over

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or sleeping in with their lovers or something—anyway, their absence, and the absence of any JennaMaras, made it easy to put it all out of her mind. Besides, she had work to do.

Back at her work station, Manda saw the seismic data she'd been waiting for had come in. She set it aside for the moment, first slipping into the live-face pack and hooking up the leads. Instantly, her liveware interface reconfigured itself around her to a higher-resolution, more sensorily based mode.

Her icons floated in the middle distance. She pivoted until she located the dodecahedral commandball from the signaling waldo, gestured to bring it closer, and, when it was in range, reached out to touch it; instantly, its data exploded into assorted complex shapes that moved to the periphery of her vision. A model of the waldo unfolded around her, as if she were a clear glass version of it, surrounded by the cold, deep, false-color sea. Her arms were enfolded in *Septimus*'s pair of rotary blades, her fingertips were transparent wires that connected to the key sampling and communications controls, and her feet became glacine connectors to steering, speed, and other controls. She was Manda-*Septimus*.

First she noted, with a frown of surprise, that *both* of *Septimus*'s thermocouples were reading higher than normal this time, not just one. Not much higher. Nothing to call the council about . . . but there was one other thing: the readouts didn't appear all that different from usual, but the current's tug *felt* just a tad stronger than usual against her-*Septimus*'s skin. It was nothing her engines couldn't easily handle, but the two of these factors together *could* mean that undersea volcanic activity somewhere in the vicinity was creating convective cells of warmer water within the trench. Her heart started beating a little faster.

Easy, Manda; don't set yourself up for disappointment. Confirm it. Her-*Septimus*'s rotors hummed, keeping her-it in place, as she disengaged from the view of the ocean floor and brought up the marine-waldo's assorted datashapes.

This data was mostly several hours old. Her marine-waldos were hundreds of kilometers away—or more—beneath a kilometer and a half of ice and many kilometers of water. Early during their occupation of Brimstone, the colonists had installed a series of phased-array sonar transponders beneath the ice just offshore, and had used them to locate a large, shallow deposit of crude oil. Beneath the crust of ice, about five or so vertical meters of chilly salt water lay atop the continental shelf with its crude oil deposits.

The refinery had long since abandoned the drill hole, since its location hadn't been ideal for tapping into the reservoir. But the drill hole *had* been ideal for Manda's purposes. Three seasons ago, when she'd first started this project, she'd pulled up the sonar transponders, refurbished them, and configured them in a phased array that would relay sonar signals to and from a fleet of marine-waldos. Manda's commands were processed by the colony computers and broadcast via radio to an exploratory drill site near the colony's petroleum refinery, which squatted in a valley three hundred kilometers east of Amaterasu, near the mouth of a glacier on the larger of Brimstone's two major continents, Arcas. It was a crude setup, compared to some of the elaborate computational links she had used with other explorer waldos in the past, but it worked.

Its main disadvantage was that sonar was not an information-dense medium. Even a phased-array setup—and even with the signal-boosting buoys she had planted here and there—didn't allow for a lot of information

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to be transmitted at once, since the frequencies she had to use were low ones. The link between Manda and her marine-waldos was a mere trickle of information across a very large expanse, and the inevitable errors in transmission and interruptions slowed things down even more. When she issued a command—to sample salinity, for instance, or descend or turn—her waldos might receive those commands several minutes—or even an hour or more—later. But her software compensated as best it could for this very long lag, and Manda's doggedness and ability to anticipate her waldos had served her well.

Manda called up some empty, transparent boxes, then grabbed the datashapes orbiting her-*Septimus*, and dropped them into the boxes. Three-dimensional brightly colored charts unfolded inside the boxes, positioning themselves around her.

She massaged the data, quite literally, moving variables and re-charting them and changing the axes around, and then stepped back and eyed the brightly colored datascape around her. She wandered through them, running her fingers over the results, and listened to the harmonics that fluctuated as she moved.

Yes!

Over the past half hour, the waldo had wandered in and out of currents a few hundredths of a degree Celsius warmer, and about a twentieth to a tenth of a knot faster, than ambient. Sonar soundings of the vicinity revealed nothing new, merely a rocky bottom with some silting, and a fairly featureless cliff-face to the west—but the chemical screens showed slightly elevated concentrations of manganese and particulates in the warmer, faster-moving eddies.

This was all very suggestive—still, she couldn't bring it to the council until she had something more substantial to show them. They wouldn't care about some little bumps that lined up. She needed more.

Manda called up a map of the region she was currently exploring, and checked the approximate location of all her marine-waldos. They were spread out over almost five thousand kilometers, at varying depths but most within thirty meters of the ocean floor. *Aculeus Septimus* had been exploring a deep sea trench extending roughly north-to-south, several hundred kilometers to the east of the coast. Its precise location at the moment was—*how interesting!* She increased the map's resolution. *Yes, it's just south of the equator.* According to Jim, the equator was a highly likely location for geothermal activity, due to rotational and tidal stresses on Brimstone's crust.

She noted that the bottom of the trench had been increasing in depth as *Septimus* proceeded southward; in this vicinity, it went down to about four kilometers below sea level. *Septimus* had been exploring along the lower eastern edge of the trench, cruising near the bottom of its design depth of four kilometers below sea level. The drop seemed to continue to the south, at about two degrees per kilometer.

This posed a difficulty. If the source of the thermal activity lay much further south, and the trench continued to increase in depth, the heat source would be below the range of her marine-waldos' detectors. Meaning she'd either have to risk losing the waldos to implosion, or give up the search.

Give me time, she thought, rubbing at the livemesh over her upper lip; *I'll come up with something.*

When she overlaid her search grid onto the ocean-floor map she'd been

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building, she saw that *Septimus* had entered a large, virtually unmapped section of sea floor that extended south from the equator.

She called the four closest waldos, *Aculei Duo, Tres, Quatuor,* and *Octo,* to assist *Septimus*. It would take a day for the nearest of them to arrive; in the meantime she needed to come up with a good search pattern. This was no time to get sloppy. And she should let someone know what was going on.

She smiled fiercely into her livemask. Success was finally—if not yet hers—at least flirting with her for a moment or two.

Manda put a call in to Jim LuisMichael, the geophysicist who had helped her develop her original seamap routines. He materialized beyond Manda's livemask, grinning through his bushy, black, ice-encrusted beard. His eyebrows and nose hairs were also iced-over, and his eyes made invisible behind a pair of small dark goggles. His microphone, a thick line, snaked across his cheek below the edge of his livemask, to perch beneath his lower lip; his radiation-alert badge was a blinking green LED at his collar. He must be using a wrist-band video transceiver, since his forearm, huge and near, faded into nothing at the periphery of her vision on the left, and the outsized tip of his mitten appeared at the periphery on her right.

She felt like a mote standing on his arm. In the background she could see pipes, distillation columns, and a portion of a petroleum storage tank.

"Manda!" he shouted over the wind. "What can I do for you?"

"I got your seismic data—thanks."

"Sure! Was it a help?"

"Oh, yes! In fact, I need your help refining my sea-mapping searches. Are you available to give me a hand?"

"Not right away. I'm out at the refinery. Won't be back for several days. We're finishing up some repairs out here. Can it wait till I-we get back?"

Manda gnawed her lip. She hated the idea of sitting idle for even just a few days, this close to her goal. But without his help developing a good search, based on the geology of the area, she'd be wasting her time. "Not if it can be avoided. Could you link in tonight, after sunset? Just for a little while?" She hesitated. "I think I'm onto something, Jim."

His eyebrows rose. "Oh?"

"Oh, yes."

"Hmmm." He nodded. "All right. I'll try. Depends on how repairs go."

As he was talking, a deep rumble came up through her soles and rattled her chest cavity. Her eardrums itched and popped. It went on longer than usual, and built in strength rather than fading, in a series of jerks that knocked her to her knees.

"What is it?" Jim asked.

"A quake," she gasped, scrambling for purchase on the thatching. "Hang on."

The jerking seemed to last forever, though certainly it must have been less than a minute. As the quake began to finally subside, a muffled *crack* shook dust off the walls, followed by a loud *whooomph.*

Shit. It's big—and close. She yanked her livesuit connectors loose and struggled out of the livepack. Jim's image depixilated to a lower resolution. He read her expression. "What now?"

"Cave-in. Big one. I'll call you back." She cut the connection as she ran down the corridor, and called the colony's support systems syntellect. Its icon appeared before her.

"Where is the cave-in?" she asked.

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"Specify cave-in."

"The cave-in that just happened, you dipshit!"

After an unusually long pause, it gave her the coordinates. The collapse had happened in a bad place, logistically: in the main traffic corridor at the colony's lowest level, which led to two of the colony's three major agricultural caverns. The livestock themselves wouldn't be affected by this, but the bamboo forest and Hydroponics might be. As well as the Fertility Labs and the nurseries and Child Rearing.

Abruptly, everything went dark but her liveface, which flickered as it switched over to battery and to an even lower-res mode. The livesuit was now running from its own processor, no longer hooked up by radiolink to the Amaterasu net. Power and communications were down.

Someone collided with her, and swore. She pulled her flashlight from her belt. Other flashlights flicked on. The array of bouncing, caroming lights added more confusion, not less. Work-waldos, now unpiloted, milled about, crashing into the humans, or froze, blocking passage. She got pushed along a set of corridors and around turns till she wasn't sure where she was.

Manda stumbled along with the rest, bumping into stray people and equipment that fell across her path, until she caught a glimpse of a staircase ahead, and recognized her surroundings. She and others crowded down the nearest spiral staircase into the catacombs on the level below. A crowd was gathering at the intersection ahead. She rounded the corner there. Several adults were herding children this way. People were shouting. Two lines were forming—rubble clearance brigades—while through the middle of the corridor other adults and teens were helping the survivors—most of them kids—out.

The children looked confused; several were crying; a couple were injured—she couldn't tell how badly; she could only catch glimpses in the poor lighting—and being carried out. She sneezed: dust and a solvent mist stung her nose. Steam, rubble, and poor lighting obscured her view, but it looked as if the collapse had occurred a few meters ahead, just beyond the child care area. About ten meters beyond the children's suites, the corridor branched and opened up onto the caverns containing the Hydroponics gardens and the bamboo. The Fertility Center was in a set of caves off of the bamboo fields. If any of the three areas had been badly damaged, the colony was in trouble.

She strapped her flashlight to her head with a strip of cloth torn from her shirt hem, and then joined the brigade. It was filthy, mindless work: take the boulders and dirt and buckets of rubble from the person ahead of her, hand them to the person behind. Some of the rocks started coming out stinking and slippery, and she realized it was blood. Or worse.

Manda grew dizzy and her vision blurred—from the shock, from the effort, the smell, and the damp heat slowly building up in the corridor from the steam-line leak. But she kept going, doggedly, passing rock after bucket after rock. Her arm muscles shrieked their agony along her nerve endings. She hurled the fury that filled her into her brigade work, grab and pass, grab and pass, snarling at the others in the line—*hurry it up, you lazy shitheads! Move it!* She knew she shouldn't, but she couldn't help it. The rage was just there, boiling inside her like a hydrothermal cauldron. It had to go somewhere.

A couple of mangled corpses came through the line, bundled in blood-stained sheets. Their faces were partially exposed and she knew them;

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everybody knew everybody—if not their given names, at least their clones. The first was a young JoeUrsula, who worked—had worked—in Child Rearing. The second was Teresa.

Numbly, Manda cradled her sister's torso and stared at it, trying to make it be someone else. But the features of the dead woman in her arms refused to change.

Manda could tell by the way her fingers sank in at the back of Teresa's head, even through the bundling, that Teresa's skull had been crushed. Bile rose in Manda's throat. Teresa's body was so terribly battered that Manda was grateful for the bundling.

She hugged the body tight, spasmodically, trying to ignore the strange contortions and parts that weren't where they should be beneath the sheet. Then she looked at the face again, stroked her sister's torn, bruised face. It was like looking in the mirror and seeing herself as a corpse—but at the same time it didn't even look like *Teresa,* much less a carbon copy of Manda.

"I'm sorry," she whispered, remembering their argument this morning. She felt dizzy. The world receded to the end of a long tunnel. She looked around, confused, half-forgetting where she was.

The man directly behind her was looking at her with a pitying gaze.

"Take it!" She forced Teresa's body into his arms. Then she tried to rub the brown, sticky, drying blood off her palms, arms, and face before the next horrible load came down the line. She found it hard to breathe. But it wasn't until several drops struck her hands that she realized that a stream of tears was flowing down her face, which had contorted into a taut mask.

Where's Paul? Does he know? Oh, God. My siblings, my siblings! Where are you?

She found herself sitting down, trembling like an ice-sprite. A woman was giving her oxygen from a portable unit. She'd been dragged out of the brigade. The woman was a young RoxannaTomas. Manda took several deep breaths into the mask, then signaled enough and struggled to her feet.

"You gonna be okay?" the other shouted over the din. Manda couldn't find the words to answer. She only returned to her place in line.

Gradually, the rocks began to come out clean and hot and wet: steam-blasted. Communications came back on-line. A kind of numbness had settled over Manda. Her thoughts came more clearly.

She remembered the extra waldos and spare parts sitting in the equipment hangar. She should check, see what kind of equipment she could throw together. The digging could go much faster. Lives could be saved.

"Who is the cave-in rescue coordinator?" she asked those coming out, repeating the question until someone finally answered. It was Arlene. She spotted her up ahead, just this side of the cave-in.

Manda left the brigade and pushed through the crowd until she reached Arlene. Her older sister was directing people who had crawled into the makeshift tunnel with beams and were stabilizing it. The steam leak had been fixed, or the line closed.

They looked at each other, and Manda saw Teresa in Arlene's face. As Arlene looked away, Manda lowered her own gaze, shoving down the horror and nausea that tried to muscle its way up again. *Will any of us be able to bear to look at each other, after this?*

Other colonists had been lost over the years, too many of them, in too many different kinds of calamities. *But never one of us. Never one of us.*

"I can bring some machines in," she said.

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"What?" Arlene squinted at her, clearly distracted.

"I can slap some big construction-waldos together to help with the digging."

Arlene frowned. "We're too cramped already. Several small rooms and corridors need clearing out and we need to go very carefully. Your waldos are too big for this work, until we get into the caverns." She paused, thinking. "But you're right that we'll need the heavy equipment soon enough. Go see what you can come up with."

Manda turned to go, but someone up ahead, someone inside the hole, shouted, "We're through! We're into the caverns!"

Word traveled back along the line; everything grew hushed. Manda strained to get a glimpse; it was impossible to see what was going on in there, with the dust and dancing lights and the workers obscuring the view.

The word came through: "The bamboo is intact!"

A murmur of relief rippled around them.

"What about the babies?" someone shouted, and someone else said, "What about Hydroponics?"

Arlene put in a call. Twin GeorgJeans appeared in front of them, crouching, out of breath. They were broadcasting on a public channel: Manda could see their filthy, fatigue-lined faces; several other people also gathered around. Dust motes drifted around the GeorgJeans. The female spoke loudly to be heard over the digging and shouting going on around her. "The Fertility Center is cut off by rubble, but we're talking to them through the vents." "There are no adult casualties yet," the male said, and both finished, "We're confident we can get them out."

"The fetuses?"

Both shook their heads. "Their backup power unit was smashed up and a lot of the fetal support equipment has been damaged as well." "Most of the vats are intact, but they have no working life support, and it's getting cold in there without the heaters." "The workers are trying to save the ones closer to term but it looks like we're going to lose a lot of them."

Arlene wiped a weary hand across her brow, leaving a smudge. Manda remembered her undecanted siblings, the new twins. A sharp pain lanced through her, piercing her armor of numbness.

Please, she thought. *Please.*

Arlene asked, "What about the gardens?"

The GeorgJeans grimaced. "We've got a lot of damage in Hydroponics. But the power plant took a hit, too." "We've got power out everywhere—" "—and we're not in communication with any survivors." "We won't know exactly how much damage there is for a while."

Arlene sighed and exchanged a grim look with Manda.

"Okay," she told the GeorgJeans, "the Fertility Center becomes our top priority. Give me regular reports. Manda," she said, as the GeorgJeans' images dissolved, "once we finish getting the Fertility Labs cleared out, we'll need your waldos for the Hydroponics cavern."

"On my way." She started to go, then looked back. "Was it the terraforming drilling? Is that what triggered it?"

Arlene stared at her. They both knew the answer.

No way to be absolutely sure. But probably. *Probably*.

Rage flooded Manda: rage at Arlene, at Derek—at all her clone. *If not for your fucking IceFlame, Teresa would still be alive!* Manda stood there for several seconds, staring at her eldest sister, bursting with the need to scream

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at her. To accuse. To denounce. Only the anguish twisting Arlene's face stopped her.

Finally, Manda turned, and hurled herself down the corridor toward the lifts to the equipment hangar, as fast as she could.

The team managed to rescue all the Fertility personnel, and those of their fetal charges still hanging onto life, within a few hours. Manda didn't ask about the baby CarliPablo twins. She couldn't handle losing more siblings just yet.

Instead, she and the rest of the team got started clearing away rubble, building makeshift tunnels and valleys through the mounds of debris that had dropped onto the gardens in the Hydroponics cavern. Power and the local network were brought back up after a while, which made things easier. Still, it was tedious and gruesome work—there were too few living and too many dead—and the fact that she was only present in proxy, piloting a team of three construction-waldos, didn't make it any less dreadful. Still, she pushed herself—and the others—very hard.

As long as she stayed busy, she didn't have to think. She didn't have to remember.

She and two other waldo pilots did the heaviest work with their six big, lumbering machines, aided by almost three dozen workers present *in corpus*. In the middle of that first night after the cave-in, the council appointed DaliaMarshall to replace Arlene as leader of the rescue effort. The fourclone spread out, each taking charge of part of the cleanup. Manda's crew leader was Abraham DaliaMarshall, a large, bluff man two or three seasons older than Manda. Abraham had been among her worst tormentors, growing up. A sneaky, vicious, back-biting bully. The rest of his clone was no better.

But this was no time for old grudges. So she worked with him. And her focused intensity caused the other workers to turn to her for guidance and ideas at least as often as to DaliaMarshall. When they grew discouraged or talked of quitting, she harangued them, admonished them, reminded them that there could still be survivors—asked how *they'd* like to be trapped in the rubble, knowing their fate depended only on the perseverance of the rescue team? For once, no one argued with her or told her she was being rude.

The LuisMichael threeclone soon returned from the refinery and pitched in, using sounding equipment and Jim's seismology expertise to listen for sounds coming from any survivors. With LuisMichael's help, they located fourteen people trapped alive in various pockets of air under the rubble. But afterward, more than eighteen hours passed and several tons of rubble were cleared with no other survivors found, only scattered remains.

Finally, they uncovered a large cache of dismembered bodies. They shipped as many of the remains as they could to the genetics people, who were getting the Fertility Labs cleaned up, and they also did swabs everywhere they saw a speck of blood or other apparent animal matter. Genetics reported back early second-watch on day two that they'd identified four different DNA signatures. Since two of the DNA sets were for two different pairs of clone-twins on the missing persons list, this meant that between four and six more people were accounted for. Probably six, since the twins were most likely working together when the cave-in had struck.

In which case, all were now accounted for except the UrsulaMeriwether threeclone: Helen, Jessica, and Rachel. The heart—and brain—of the Hydroponics effort.

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Looking across at the wreckage of the gardens, mottled by debris-fragmented beams of light from the searchers' lamps—the broken, bone-colored remains of stalagmites and chunks of shale-like rock that lay like a stifling, multi-ton blanket over the shattered trays and tubes and wilted vegetable matter—Manda had to admit, if only to herself, that there were probably no more survivors. UrsulaMeriwether was dead.

With a sigh, she wheeled Mole and Crane over to join Scaffold, whose rear right tire had gotten stuck in a hole. The workers building a permanent embankment there needed the scaffolding waldo out of the way to finish their task, and her efforts to unstick it under its own power had failed. She-Crane lumbered up, latched onto her-Scaffold with her-its hook, and lifted her-Scaffold up and out of the way. The workers below waved weary thanks as she-Crane set her-Scaffold down. Meanwhile, she-Mole caught a glimpse of the hole she-Scaffold had been stuck in. It was a floor drain whose grating had buckled under the bulky waldo's weight.

A floor drain? A floor drain? Back in her projection pod, Manda frowned, and detached from her livepack leads for a moment. Her liveface diminished in scope to a simple 2D display. She stretched with an enormous yawn and took a long drink of water from her bottle, then sat down on the floor and did some yoga stretches to invigorate herself.

She was so tired that it was hard to think, but there was something important about this. The drains.

A floor drain, she realized suddenly, meant that there were conduits or trenches *under* the floor. Tunnels perhaps big enough for a human to crawl into and avoid being crushed, if that person were a quick thinker. Which UrsulaMeriwether was.

DaliaMarshall—Abraham's vat-twin Robert, to be precise—showed up in her workstation as she was calling up schematics for the lines under the gardens. His eyes were sunken and dark with fatigue and his face was dirty, gaunt, and lined. Manda stood to face him, and stiffened when she read his expression. She knew why he was here.

"Manda. . . . " He sighed at the look on her face, and started again. "It's time to give it up. We've done all we can."

"I have an idea," she said. "I think I know where UrsulaMeriwether might be."

He groaned. "Not another one."

"Listen to me—there's a drain—"

DaliaMarshall talked over her. "We've chased down two of your possibilities already and hauled tons of junk for nothing. It's been too long. They're all dead. It's time to quit."

She stared at him coldly. "*You* give up, then. There are still at least three unaccounted-for. I'm not stopping until we find them—alive or dead."

"You are fucking *impossible!*" he exploded. "Abraham's right about you."

"And you're a coward," she said. "Afraid to finish the job you started. Why the council would put your clone in charge, I have no idea."

He went pale and his lips thinned. "I-we am pulling the crew. You do whatever the hell you want. And the council will hear about this."

"Fine. Give them my love."

He gave her the fist of contempt and stalked out. Manda slumped against the wall and laid her forehead on her arm, feeling quivery and empty.

What am I trying to prove? she thought. She was exhausted, too.

This one last time, she thought. *I'll check this one last thing. The floor*

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drains. She dragged herself back to her feet and jacked into her livepack, and the full-sensory interface bloomed around her. When she faced into Mole, DaliaMarshall, the three remaining siblings, were overseeing the equipment cleanup. Most of the workers were already leaving. The other three big machines were gone.

A cold, hard pain squeezed her chest.

"Go, then!" she yelled. "Give up when there may still be people alive in there! Cowards! Go ahead and *go.*"

She split her liveface into three and faced into Scaffold and Crane as well as Mole. Turning her waldos' backs on the departing workers, she switched on her headlights and sent the three of them lumbering clumsily and faithfully back into the rubble mounds.

To her surprise, one of the LuisMichaels followed her. It was Jim! It must be. His clone-sibs, Amy and Brian, hesitated only for an instant before following as well. Once they reached the end of the tunnel, Manda-Mole called them over. They crouched in a pool of light cast by Scaffold, amid clouds of dust and piles of loose debris, and she replaced her own image on Mole's belly screen with a schematic of the Hydroponics cavern, pre-collapse. Then she superimposed a rough sketch of the rubble; it blanketed the schematic like a foul mirage. The mirage had red veins running through it, which she-Mole traced with her-its claw hand.

"We've dug tunnels and set up listening equipment here, here, and here," she-Mole said. "But this large section over here, near the offices where the worst of the collapse was, is unexplored. And it's also most likely where UrsulaMeriwether and some of its top people were."

LuisMichael frowned at the schematic, and shook its heads. "But the offices abut the bamboo caverns right here, see?" Jim told her. "I've listened on the other side of the wall. I didn't detect any sound, not even breathing."

"And our seismic tests of that area made it clear that there are no air pockets of any size in that vicinity," Brian pointed out.

"Not in the offices, no. But see this subterranean line right here? It's a floor drain and see?—there's a grating on the floor just outside the office. The quake lasted for several seconds before the cave-in occurred. It's possible they had time to make it to the drain."

"In which case, they'd have run out of air by now," Amy said.

"Not necessarily. Not if they belly-crawled through to here." She pointed.

"The runoff catchment sump?" Amy asked, dubiously. "That's a good twenty-meter crawl, with two grated openings between the office and the sump." Brian went on, "The drain would be blocked by debris."

"I don't think so," Manda replied. "At least, there's a reasonable possibility it wasn't. A lot of the rubble has been larger than the grating gaps. And they could dig some, if they had to."

The three exchanged a glance.

"And look," she went on. She changed the overlay to a schematic of the level just beneath the floor. "All these utility pipes run on top of the sump. They're undamaged and some are still operating. Adding up to lots of vibrations from fluid flow and transmission of engine noises. They would mask any sound the survivors might make."

Brian and Amy shook their heads, but Jim nodded, slowly, after a moment. "It's worth a try. Where are we, in relation to the sump?"

Manda-Mole pointed straight down between its tractor treads. "Almost directly above it, according to my calculations."

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Brian jumped up. "I'll get the utilities shut off—" "and we'll bring plumbing equipment back with us," Amy finished. They ran off, while Jim started setting up his sounding and seismic detectors.

Let this work, Manda thought. *If it doesn't, I'm out of ideas.*

It didn't take long for Manda-Mole to tear through the thatch floor and the dust and rock layers, to reveal the utility pipes that overlaid the drainage conduit about a meter and a half below the floor.

"There it is," she-Mole said. In the dimness, numerous utility pipes ran on top of the concrete floor drain, both parallel and crosswise to the drain. She saw no indication that the floor drain discharged into a sump within the confines of the large hole they'd dug. "We're not as close to the sump as I thought."

"That's okay. If they're anywhere in the vicinity, with the utilities turned off I should be able to hear them." Jim scrambled down into the hole, aided by Brian, while Amy loaded the seismic and other sounding equipment onto a pallet. The triplets worked with a silent, intent efficiency that gave Manda a pang of envy.

Back in her work station, Manda disconnected from her livepack and then made her way to the caverns. She could be more use *in corpus* for the finer-scale work, and if more heavy work was necessary, her lower-res interface was adequate for controlling her waldos on-site.

Besides, she wanted to be there, in person, when—if—*when* survivors were found.

By the time she arrived, Jim had climbed down among the pipes and was brushing away soil. Amy and Brian were lowering his sonar equipment down to him on a rope.

"I'll need more light," he said. Manda-Scaffold shuffled over to shine lights inside the hole. A rumbling started. Terror knotted in Manda's throat, and she looked up at the cave ceiling, then around at the swinging lights, at the clouds of fine dust that rose. Small rocks pelted the ground here and there, with a sound like hail. The air choked them with fine dust and the smell of ruined vegetation. LuisMichael's gazes met hers, its own eyes wide with fear.

But it was just the usual small-scale tremors, and they died away in seconds. Amy and Brian continued lowering the equipment. Manda re-connected to Scaffold and adjusted the lighting at Jim's direction. Then they three waited, while Jim placed leads among the pipes.

"Turn on the detector," he said finally. Amy squatted next to the sound detector and turned it on. Lines appeared on the screen. "I want everyone to be very still." The lines on the screen peaked and bounced in response to his words. "No talking, no shuffling, and breathe as quietly as possible."

They fell quiet, and the squiggles died down to small, occasional wiggles. Manda resisted scratching a sudden, fierce itch on her leg. Her heart was beating harder than usual, a response to the tremors as well as to the thought of finding UrsulaMeriwether. The noise was loud enough that Manda half-expected the detector to pick it up.

"Nothing unusual," Amy said after a few moments. "You want to come check it out?"

"No. You know what to screen for. I'm going to move the leads. Any idea which way the sump might lie from here?" he asked Manda. She checked her maps once more, and leaned over the edge of the hole to check the pipes.

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It was too hard to tell precisely where they were, in the midst of such ruin, but the sump *should* be almost directly below. Somehow, her calculations were off.

She chewed her lip, then pointed. "Let's try that way."

Again Jim set the leads, this time at the edge of the hole where she'd pointed, and again asked for silence. After a moment, Amy exclaimed, "I think we have something!"

Jim climbed up out of the hole and hurried over. All four crowded around the readout screen.

"See here?" Amy whispered, pointing at one set of squiggles. "And here."

"I see. Shh." Jim studied the lines, wearing a deep frown. "Well, it's something. Hard to say what. It could just be micro-tremors. Manda, do you think you could clear away that section of flooring there?"

Things proceeded like this for some time, with Manda digging and scraping, and the other three moving the sound equipment and listening, with equivocal results. They couldn't seem to locate the sump. They were all so exhausted that the mere act of lifting an arm or speaking a few words had become too great a chore. The hint of sound Jim had detected never panned out into anything. They were all growing discouraged. Manda suggested they take a short break, and volunteered to bring back food and water for everyone.

The mess was full of people, but no one said much. She tossed two decachips onto the counter next to the cashier syntellect. The syntellect told her, "The colony is on emergency rations. No one may have more than six chips' worth of dinner."

Manda wasn't surprised; the destruction of the gardens was an extremely serious loss. The colony might not survive it. "I'm collecting for Luis-Michael, also," she said.

"How many people total?"

"Four."

After a brief pause, the syntellect approved the additional purchases. Manda looked at the food on the tray. *Going to be a lot of hungry people around here.* She took the water bottles, fruit, and crispy-duck-and-bamboo-shoot *mana*-rolls the robotic arms had assembled and headed back to the dig.

Her companions took the food and ate greedily. It was all gone too quickly. After a few moments of silence, Brian took a slug of water and then said, "We've been talking it over, Manda. It's almost fifty hours since the cave-in."

"We can't locate the sump, and even if they made it there, they've probably run out of oxygen or died of exposure by now," Amy said.

All three LuisMichaels looked so tired. Her own limbs felt like they were made of jelly. It was all too much. Too much for such a small group to do alone. "The others should be here helping," she said, and slumped over her knees. "It's a big sump. There could still be some air left."

LuisMichael stood and brushed itselves off. Jim said, "Come on, Manda. Time to call it quits."

The pause lengthened as she looked up at them. The familiar anger came on, and abated.

Manda, you know they're right. She really had given it everything she had. With a sigh, finally, she opened her mouth to say so.

Then closed it.

Then shook her head.

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"I can't quit. Not until I find the sump."

The others exchanged glances filled with depths she couldn't read. When Manda next looked up, Jim was still there but the other two had gone.

"Till we find the sump," he said. "And that's it."

"Thanks, Jim," she said hoarsely, and blinked away tears.

They did extensive sonar soundings along all sides of the trench they'd dug, and Jim finally reported that there *might* be a large air pocket not beneath *this* floor drain, but beneath the one on what would be two aisles over. "*May,*" he emphasized. "I could just be picking up empty piping or a crack that formed in the floor and didn't get filled in."

This meant excavating several cubic meters of rubble before they even got to the floor. Manda eyed the mounds she must move—mounds of dirt that were even higher than they had been before she'd started—and a feeling of futility rose in her chest. The fucking sump could be anywhere.

But if it were one of her own siblings, she'd work until she collapsed. Would she do less for UrsulaMeriwether?

"This will take a while," she told Jim. "Why don't you get some rest, and I'll call you when I reach the pipes under the floor." He gladly took her up on the offer.

She first made a very careful study of the maps. Then she started digging.

Those next four hours, working alone in the enormous cavern, were the longest yet. She felt more tired than she ever remembered being—it took all she had to remain awake, huddled in the rubble surrounded by shattered Hydroponics equipment, in a dusty, fragmented pool of light, while Mole and Crane and Scaffold's grinding, hammering, clanking chorus echoed against the dark upper reaches of the cavern, and returned to her in wobbly, staccato mimicry of itself.

Yet she found a certain peaceful rhythm to the task. Several times she dozed off and reawakened to find her waldos standing lifeless nearby. She got up and paced as she worked, shaking her head, slapping her cheeks, swinging her arms—willing herself to stay awake as her three massive machines clanked and rumbled and bucked, first one, then two in concert, then the third, clearing away the rubble.

And finally she reached the floor, one aisle over. She-Mole tore through the thatch and rock and dirt, and she-Crane lifted the chunks of debris away, and now she was down to the piping. She was tired enough that she misjudged the depth and marred the pipes, rather than just skimming dirt from them. *Fuck it,* she thought. *It's a small price to pay.* The rubble she had moved to get there made a dark mountain beyond Scaffold's stick legs. She called Jim.

"I'm ready," she said. He rubbed his eyes and sat up, blinking.

"Be right there." His words were slurred by fatigue.

Jim came, and so did Amy and Brian. As they were setting up, most of the other rescue workers who'd left earlier trickled in. And Derek and Arlene. Word had apparently gotten around.

"LuisMichael told us about your idea," Derek said, at Manda's curious glance, and Arlene said with a shrug, "It's worth a shot."

Jim climbed into the hole and squatted on the piping. Beneath his feet, the curved, bone-colored sump lay. He took out a wrench, reached down between the pipes, and tapped on the sump. It rang hollowly. Everyone waited. Nothing. After a long pause he tapped again. And there was an answering thump. And more thumps. And muffled voices.

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Cries of excitement went up. Several people jumped into the hole and began trying to pry the pipes out of the way, while others started hammering and banging shovels on the floor drain. Manda whistled for attention, and she-Crane lumbered up.

"This will be quicker," she said. "Everyone out of the hole."

Jim shouted, as much for the sump's occupants as the workers, "Stand clear!"

Manda-Crane grabbed the pipes and floor drain with her-its claws and tore a two-meter segment of conduit away, with torn pipe segments trailing streams of fluid. When she-Scaffold rolled over to the hole and shone her-its lights back into it, the sump had an opening in its top, which had formerly been connected to the concrete floor drain. Manda jumped down into the hole with the LuisMichael triplets. She and Jim climbed down among the severed utility pipes and shone their flashlights into the sump, and their beams glinted off the upturned faces of four very dirty, shivering people: the UrsulaMeriwether sisters, and a JennaByron—one of the clone-siblings assumed dead.

Manda stumbled over to Arlene and Derek, while others moved in to help the survivors out. Derek opened his arms and she walked into them; they gave each other a long, wordless hug, and Arlene wrapped her arms around both of them. Manda pulled back and eyed her older siblings.

You saved the colony, Manda.

They didn't say it; they didn't have to. The pride and love they felt gleamed in their gazes, even amid the still-raw sense of loss.

It was time to ask. "The twins?"

"We lost the girl," Derek said. "The boy is hanging on. They have him in intensive care. It. . . ." His voice broke. Arlene finished in flat tones, "It doesn't look so good."

Manda pressed herself against them again, and hung on tight. She felt as if the world were coming to an end. Perhaps it was.

Two days later, Manda visited her little, unnamed brother. Paul was inside the intensive care unit, masked, holding the baby in his gloved hands under a bank of warming lights. The baby was hooked up to an IV and several monitoring wires. The infant looked so pitiful, punctured and wired as it was. (*Not it,* she reminded herself, sharply; *him.*) And the look on Paul's face was so intensely sorrowful that Manda couldn't bear to look directly at him, either.

She grabbed a mask and entered the room, and sauntered rather too casually over. "Hi."

He didn't even glance at her as she approached. She saw that Paul's right hand cupped the baby easily; he was that small.

"How is he doing?"

"I talked to the doctor. They say he's stable, he's gained a little weight, and his lungs are in better shape."

"He's a fighter," she said. Paul nodded.

"He might make it." Paul stroked the baby's hair with a thumb. "Poor little guy."

Manda realized that he meant, *poor little guy was going to* live. And that Paul was here to say good-bye to him.

"Being a single isn't *that* bad," Manda said mildly. He gave her a raw, shocky look; Manda guessed he hadn't slept at all in the three days since

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Teresa's death. He opened his mouth; *you don't know what it's like.* But of course, in her own fashion, she did. He closed his mouth and looked at the baby again.

"It's different when you grow up together, I guess," Manda said.

Paul nodded, swallowed convulsively. "Perhaps you're right. He won't know this—" His voice cracked and bled. "This pain."

Fear grabbed Manda—fear of saying the exact wrong thing; fear of what would happen if she remained silent. She took a deep breath. "Paul, we need you."

Surprise and anguish flicked across his face. He slipped his hands out from under the baby and turned away from her.

"I can't, Manda. I can't. Part of me is already dead." He paused. "I reach out," he said, lifting a hand to empty air, "and—where she was, I reach for her and—nothing's there. I'm hollowed out. I'm nothing." He closed his hand and brought it to his chest. "Teresa. Oh, God. Help me." He doubled over, and his voice became a growl of pain, a mantra. "I can't. I can't."

So Manda took hold of him, and they sank to the floor together. He howled his anguish. His fingers gouged into her and his tears poured out and soaked her sweater. Then he tried to silence himself, and bit her shoulder so hard it hurt even through the multiple layers she wore. She saw staff come running, and shooed them out.

Once Paul's grief had abated, she took his face in her hands—his face so like lost Teresa's.

Teresa. Teresa. As you love Paul—as you love me—give me the words.

And the words came. "Listen. Right now I know you don't care. Not about yourself, not about me, or our clone, or the colony. You don't have to promise me you won't ever do the recycler dive, or go walkabout without your gear. Just give me this one day. Just hang on until tomorrow."

He shook his head like a musk ox plagued by a shepherd dog's nippings. "Can't," he whispered. "Can't."

Manda gave his shoulders a shake. "You listen to me! You think I don't know the pain you're feeling because my own twin died before I was decanted and I don't remember him. Well, guess what? I live with that loss every fucking minute of every fucking day of my life, and *have,* ever since I was old enough to understand why everybody thought I was a bizarre and useless freak.

"Well, I'm going to prove to them how wrong they are. This colony needs me, Paul, whether they know it or not. And they need this little baby. And they need you, too."

Paul had gone limp and unresponsive. After a moment Manda released him and draped her arms about her knees, sitting on the cold floor, eyeing the banks of equipment and the three other babies struggling for their lives.

"Teresa cared about this colony," she went on more quietly. "More than anything else. More than even her clone. If it had been you who had died, she would have hung on anyway, through the pain. I know it."

Paul just looked at her.

"You know good and well," Manda went on, "that she would rather you suffer every bit of this pain you're feeling than throw your own life away. She cared about the colony more than anything in the world." *She cared about me.* "She cared about you."

Anger coursed across his face. "What the fuck do you know about it? About *her?* You, with your selfish, loner attitude—you've always refused to

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have anything to do with us. With *her!* All you ever did was bring her grief! How can you possibly know what it's like?"

Then he lowered his head and hunched his shoulders and sobbed again: this time a child's helpless, heartbroken tears. Manda felt abashed. She watched him for a moment, touched his head. Then she stood up and took the infant in her own right hand.

It terrified her, how tiny he was. It awed her, that a human could be this small, this unformed, yet live.

"His name will be Terence," she said, and knew then that he would defy the doctors' worst predictions and live. As had she.

She held out her hand to Paul, who had grown quiet. He gripped her hand in his own—as tightly as if he were clinging to life itself—and stood up beside her. His face contorted.

"A good name," he said finally, his voice hoarse.

"Give me until tomorrow," Manda said, and gave Paul's hand a last, hard squeeze.

He didn't answer or even look at her, but she sensed a softening in his resolve, and clung to that, as she watched him leave.

Brimstone's tides were powerful and chaotic, much more so than Earth's. During Brimstone's long summer season, they wracked the coastlines, tossing massive chunks of ice up onto the land as if they were children's blocks. And death, it seemed to her, came on like the tides. It bore down, unstoppable, sweeping its victims away, pounding the survivors into numbed, mindless submission, leaving a heap of wreckage on the shore, of chaos, pain, shattered lives. Leaving the survivors to sort it all out and find a way to go on.

The tide had taken something else away from Manda, she realized, besides Teresa. It had reached in and dragged away her most secret and terrible anguish. She'd done something worthwhile for the colony. For the first time, *she* knew—if they did not, yet—that they were wrong about her.

She discovered in herself a renewed determination to continue her undersea mapping. She'd keep at it till she found the seafloor vents. She'd take her marine-waldos to that dark and cold and lonely place, and return with whatever glorious secrets, whatever marvels, whatever treasures of alien knowledge Brimstone might harbor.

Her gaze went to her infant brother, Terence. Though Brimstone's tidal quakes had undoubtedly contributed, it had certainly been the penetration to Brimstone's mantle—the terraforming effort—that had triggered the cave-in. Death had exacted a terrible price for Project IceFlame: a blood sacrifice. But terraforming also meant that Terence and future generations would be able to walk and work and love freely on the surface of Brimstone someday. Teresa hadn't died for nothing.

It mattered, somehow, too, that Terence had come into the world even as Teresa had left it. His presence—his struggle to live—gave Manda hope. If she could just hold on long enough, some tomorrow down the line would be better than today.

She'd give it until tomorrow. As many times as it took. ○

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BACCHANAL

Your party is getting out of hand. The frat boys become satyrs, but they brought the kegs and the pretty girls so you can't complain. There's no food, really, but you can take fruit from the trees. The cheerleaders take off their sweaters and turn into nymphs. Somebody throws up in your shower, but it's only Bacchus, so that's all right. Eventually the water turns to beer and then to piss, and the resident sorcerer mumbles something about alchemy and fondles the dryad who lives in the bookcase. Your dog looks like a

basilisk and he's trying to turn your oblivious cat to stone. Your bedroom door is closed but you hear the heavy breathy sounds of occupation from the other side. It sounds like Bacchus and at least three nymphs and you don't see that sheep who was hanging around the kitchen earlier. You're getting pissed and wondering if you have any clean sheets. Nope. The satyrs are using them for togas. All the nymphs are taken, and this palace doesn't even look like your place anymore, so you can't throw anyone out. You go

outside for some air and hear singing. You follow the sound to a gold and marble fountain where your patio table used to be. There's a blonde dressed in sea foam and clouds in the water, singing a wordless song. You can just make out that she used to be that girl who works at the library. You went out with her once. Now she's looking at you, smiling, and you realize she's a siren and she's drawing you in. You can faintly tell you're doomed but that's all right. You were beginning to think she'd never call back.

—Tim Pratt

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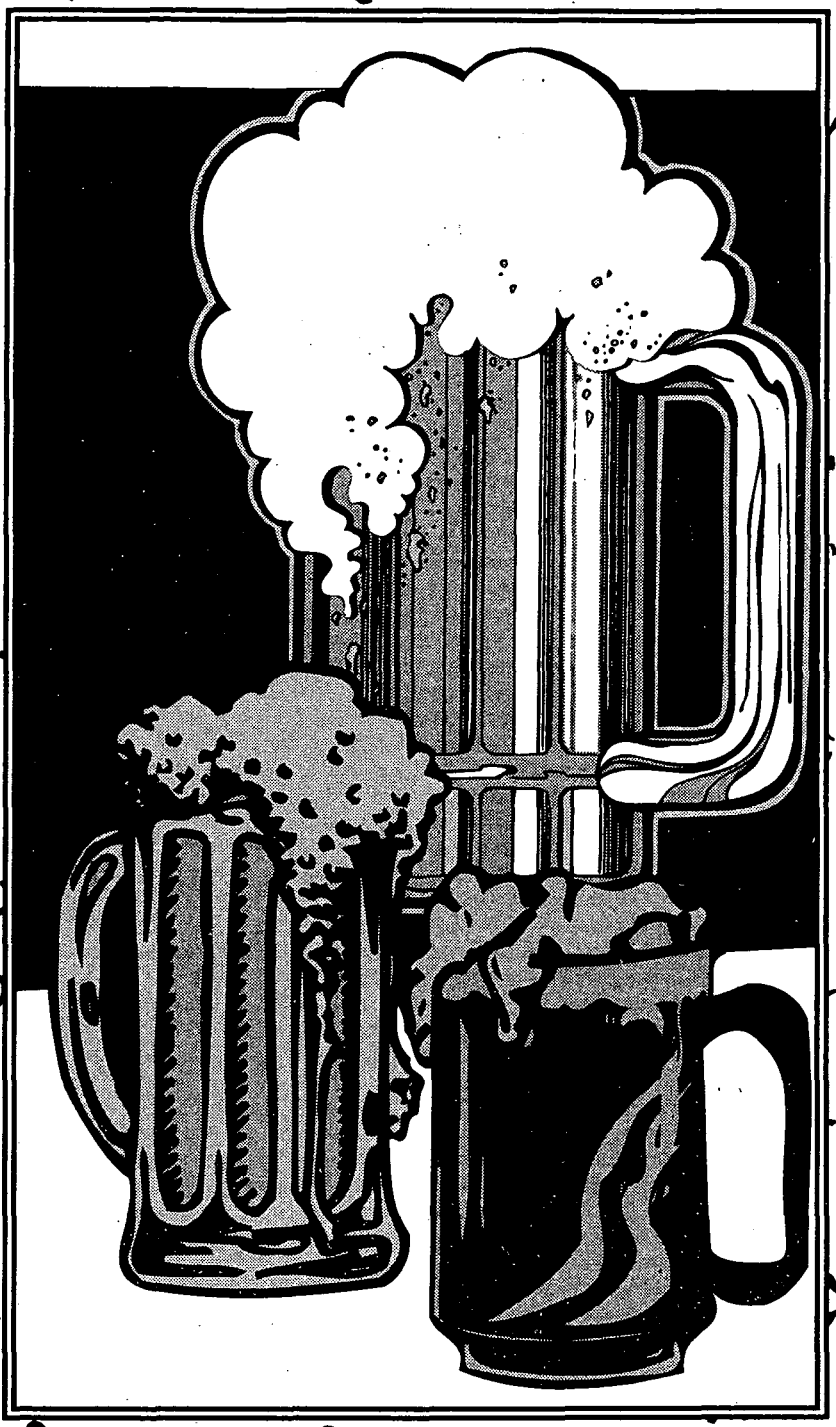

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COCKROACHES

Joseph Manzione

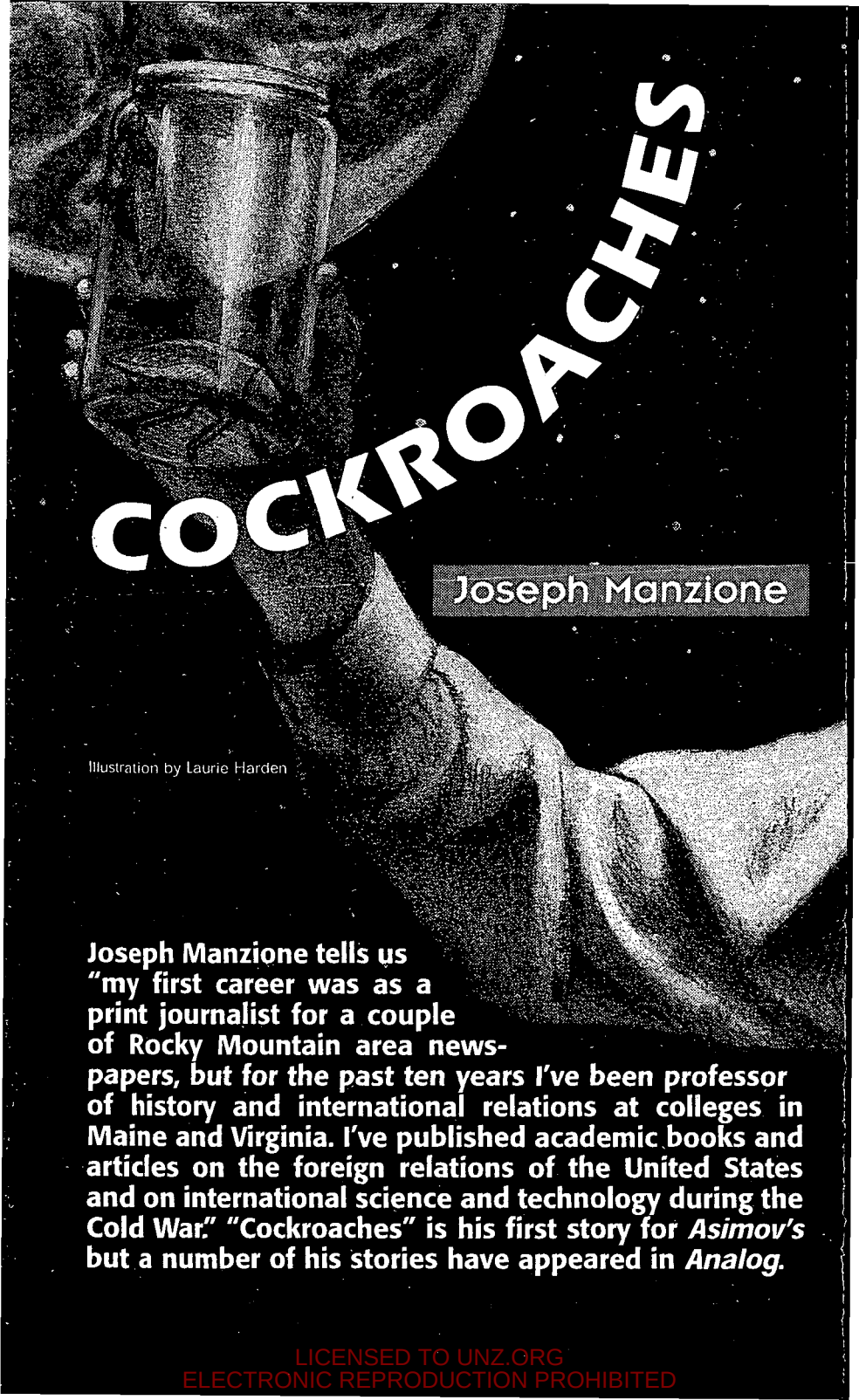

Illustration by Laurie Harden

Joseph Manzione tells us "my first career was as a print journalist for a couple of Rocky Mountain area newspapers, but for the past ten years I've been professor of history and international relations at colleges in Maine and Virginia. I've published academic books and articles on the foreign relations of the United States and on international science and technology during the Cold War." "Cockroaches" is his first story for *Asimov's* but a number of his stories have appeared in *Analog*.

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birch trees. A small figure stands
framed in the warm, orange-yellow light of a shaded lamp. It's my son. He's watching out for me, waiting for me to come home. What an irony. He's what I'm thinking about now. He's four, an age when everything is beginning to make a little sense. All he wants to do is gather impressions and ask questions about how things work and why. For God's sake, what can I tell him now, after what I've just learned?

The answers we discover in our early childhood remain with us all of our lives. When I was very young I read a short story that seemed to say everything to me. Representatives from an advanced galactic empire arrived on Earth to save a few human beings before the sun went nova. The aliens were puzzled when they couldn't find anyone. Humans hadn't had time to develop interstellar spaceflight to escape. Then the aliens discovered a fleet of crude chemical rockets in nearby space on a generations-long voyage to another star. They were so impressed by the humans' intelligence and audacity that they joked about finding the new galactic competition. Their joke was closer to the truth than they realized.

I grew up reading stories, watching movies and playing computer games based on similar themes. Humans you just couldn't kill. Aliens shaking their various heads in amazement. Pity the poor aliens: the humans never gave up, whether you torched them, sprayed them, or stomped on them. The cockroaches of the galaxy, somebody called us in a novel or a game I've long forgotten.

Being a galactic cockroach made me feel good about myself. Lying on my back in the cold grass of my parents' backyard in northern Maine, scanning the night sky with an old pair of binoculars, I thought I could do everything. I could warm my small fists in the fires of Arcturus or wash myself in the winding sprays of radiation from the pulsar at the heart of the Crab Nebula. Often the wind and ghostly movements of white birch branches across the spangled sky would put me to sleep. I would dream about flying through the void to great suns, gaseous clouds, and astonishing planets peopled with strange beings great and small, who showed me things that no one else (I thought) could imagine. Inevitably my father would come and carry me away, sleepily protesting, and place me gently in my bed.

I wanted to be an astronomer, until I realized that astronomers only *watched*. The space shuttle was a low-orbit truck; being an astronaut was like having the door thrown open and not being able to step through. I was nine, ambitious, and born way too early. Then my father, a middle-level executive for a wood products company, brought home his first computer, a Kaypro with an 8086 processor, a half-meg of memory, a couple of 360K floppy drives, and a four-color RGB monitor. A few weeks later we were down south in a book store in the shopping mall in Bangor, and I noticed a shelf of software near the children's book section. Among the copies of MS-DOS, *Wordstar*, and *DBase* was a slim, magazine-sized package with a wonderful illustration of a spaceship in orbit above a gaseous planet. *Starflight* was the title of the game, and on the back it promised me that I could explore hundreds of stellar systems using my father's PC.

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I had to have it. Twenty-one dollars was an extraordinary price, but I absolutely had to get my father to buy it. He must have sensed something (I was nearly in tears), because he gave me no argument. A couple of hours into the game, I had my answer: If I couldn't get into the sky, I could at least recreate it, tweak it, and ultimately create worlds of my own, all in little boxes like the one that sat on my father's desk. When I finished high school in Presque Isle, I went to MIT, and from there to Silicon Graphics and Sun Microsystems. When I started giving interviews about the software I'd developed, I decided that it was time to create my own company. You can find my hyper-relational databases, simulations, graphics applications, virtual reality engines, self-initiating and self-coding operating systems, and AI structures everywhere.

My son discovered the moon when he was a year old. "Moon!" he'd cry, sitting in my lap on our deck in the evening. It was his first word. "Moooon!" I put the binoculars to his face and taught him how to keep his eyes open and look through them. I named the lunar seas and craters and mountains for him. Yesterday he asked me whether anyone lived up in the sky where the stars are, and if so, who? A tough question. We talked about Fermi's paradox: the universe is billions of years old, so why aren't they here by now? I told him that I didn't know the answer. Maybe someday. Maybe they're around, and we don't know it. But I can see where my son's curiosity is taking him, not in the details, but in the direction. Up. It's the greatest thrill of my life.

I thought I could do it all, and I knew my son was going to do even more than me—until today.

My wife is an academic historian. Historians are either the very brightest or among the dullest people in the world. There is no in-between in that profession. My wife is magnificent. This morning she took me to a conference in France.

I had just settled into my seat when the President of the United States glanced at me and said, "Dr. Asherwood, my secretary forwarded a report to you. Have you read it?"

I hesitated. The light streaming through a large, open window threw the president's head and shoulders into silhouette. But I could see the glint of the pince-nez spectacles perched on his narrow nose. The eyes behind the glass—shadows, really—seemed hard and appraising.

"Uh, yes, Mr. President, I looked at it in the car out from Paris."

"Very good. We shall have need of your help in settling some of the thornier issues of industry and commerce, especially those regions of the world where Great Britain and France have granted independence." And he nodded at the figures seated on the other side of the broad, polished table.

Someone drew a thin curtain across the window. The light, muted and rose-colored now, revealed more of the president's face. The iron-grey hair starkly combed to one side, the spectacles and cold, gray-blue eyes, the hollow high cheeks and thin lips pressed tightly together were familiar from the photographs. But the face itself remained an incongruous addition to the baroque architecture of the Hall of Mirrors in the Palace of Versailles, or even to the rough and tumble politics of America in the new century. *It's true,* I thought, *he really looks like a Presbyterian minister or a Princeton history professor.*

Now one of the figures across the table was speaking in French, an older

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man of great personal gravity, a heavy jaw, white hair, and an enormous walrus mustache. He gestured toward another man at the end of the table. With a start, I recognized the mustached man as Georges Clemenceau, the French prime minister, and the man he was pointing at—slight, bald, huge forehead, dark goatee and penetrating eyes—was . . . *Lenin?*

Vladimir Ilyich Lenin at the Versailles Peace Conference in 1919? My wife was having some fun here.

I was so surprised that I missed the translation of Clemenceau's question. I turned to the president as he answered.

Woodrow Wilson said: "Mr. Lenin arrived by train from the *Soviet Union*—" pronouncing the words carefully and acknowledging Lenin's nod and slight smile—"last night. We've agreed to have a representative of the current Russian government here for consultation. Mr. Lenin asked to come himself, to be a partner in our deliberations. Despite some grave reservations, I've agreed to this, and I've given orders to begin withdrawing American military forces from Russian territory."

I was amused by the reactions of the Allied ministers. Clemenceau threw up his hands. *"Mon Dieu!"* he spat, loudly enough so that everyone could hear. David Lloyd-George, the British prime minister, simply sat back and looked at the ceiling, shrugging off an aide who was desperately trying to attract his attention. The Italian leader, Vittorio Orlando, knotted his fingers together and looked very worried.

Just like Maggie to slip something like this into the simulation, I thought. *Juice it up, make people think.*

As counterfactual history, it was a fascinating scenario. Two nations that offered different alternatives to the centuries-old world order based on European colonialism, two nations who would become the principal adversaries of the second half of the twentieth century, here at the end of the First World War collaborating against the imperialists. What might have happened?

Happy with my wife's audacity, I came back to the conversation at the table. Lloyd-George had just finished complaining about the political consequences for the Liberal-Conservative coalition if the British government dealt with the Bolsheviks on friendly terms. Clemenceau now stood up and shook his finger at Wilson. "Representatives, *oui!* Partners, *non!* You ask for too much, Mr. President!"

Wilson glanced at Lenin. The Bolshevik leader smiled sardonically and shook his head.

The president stood up and leaned across the table. "Sit down, Mr. Clemenceau."

There was a decisiveness and a calculated recklessness that did not cohere with Wilson's historical image. However, it didn't appear to distort the depths of his personality or his conditional and circumstantial responses. There were some very subtle scale algorithms and array parameters operating in the AI, I could tell. Maggie had been busy.

"I need hardly remind the governments of Britain and France that the peace at the end of a war is the greatest risk of all," Wilson said. "Mr. Lloyd-George has been telling the press that for months. Do you believe that this war is over? Well, I think not. Germany may be defeated, but the forces that she represented are still loose upon the world: colonialism, poverty, oppression, cruelty, demagoguery and disorder, and the lack of a moral center. If we do not take calculated risks for the sake of peace, then our time will be

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but one interlude in a single great war. And who can say how long such a war may last? Perhaps until the end of this century."

Wilson stared at Clemenceau. "And if that is not enough to think about, Mr. Prime Minister, I would remind you that the Allies owe the United States billions of dollars in war loans and sales. I insist that my decisions be taken seriously!"

Clemenceau scowled and sat down. The smile on Lenin's face was no longer sardonic.

The president turned to me. "Dr. Asherwood? My secretary reported to you about the difficulties of rebuilding the economies of central and eastern Europe, and providing for conditions in former European colonies as the Great Powers withdraw. There is also the question of recovery in the Soviet Union, although Mr. Lenin has spoken to me about a new economic program that I find . . . interesting. May we have your reaction to the report?"

"Certainly," I answered. I was shocked. This was certainly not the president who had been eaten alive by British and French diplomats during the 1918 peace negotiations. "Uh, the report reminded me of the Marshall Plan because the core assumptions about extended economic privation and phase changes in political systems are the same. . . . Oh, but you don't know about the Marshall Plan, do you? Wrong decade, wrong war. Well, okay, let me start by pointing out that people who lack the basic necessities of life will be desperate, and desperate people are susceptible to radical solutions that can challenge the existing social order." I stopped and glanced at Lenin. *Uh-oh.* I pressed on: "It's a concept that leaders of the Progressive movement in America, like yourself, Mr. President, are familiar with. In such cases, economic and political planning for recovery and reform are one and the same. . . ."

"How'd I do?" I asked Maggie a couple of hours later, when we emerged from the VR "cave."

"Good," she replied, and kissed me on the mouth. "Although I'm not sure how trying to sell the Wilson administration and the Bolsheviks on the merits of the Marshall Plan, the World Bank, and the International Monetary Fund will screw up the simulation program parameters for events in the thirties and forties, but we'll see! And what you did during the social hour following the meeting! Suggesting to Wilson he ought to make peace with the Republican Party, and telling Lenin to get rid of Stalin and take care of his own health!" She laughed. "I didn't think you were such a student of the twentieth century, Alan. Bretton Woods and GATT rounds in 1919, huh?"

"Survival," I said. "Got to know these things, married to you."

Maggie handed me a cup of coffee. "So tell me what you think about the system we've got set up here. Could you see any design flaws? Flat areas or parameter-spoffing in the virtual matrix?"

"No big issues. Couple of flats, mostly with minor character personality arrays. But you know how it is. Depth-of-character perspective is such a subjective thing. I really liked the way the program seamlessly integrated major character arrays with the event-variables with no spoffing at all. I mean getting Clemenceau to act like Clemenceau at the Versailles conference is hard enough, but getting him to act like Clemenceau when he's unexpectedly confronted by Lenin—that's state of the art! What kind of anchor code are you using to get that effect?"

"It's part of a developer's toolkit. Government stuff. The intelligence community used it, and maybe the State or Defense Department, too. They just

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released a version to the university consortium. I convinced the chancellor's office to give me access. I don't know what the toolkit was for. Modeling real personalities and scenarios, maybe. You know—"

She stopped short. "You know, maybe they were using it as an outcomes generator, just like we're doing here. Maybe they were trying to predict outcomes to contemporary policies, like how the Russians might react if we tried to kick them out of NATO again."

She shook her head. "I hope not. I'd hate to think that the government was making policy on the basis of something as thin as a sophisticated outcomes generator. Too much bias, too many variables, and a lot of third-order chaos in the process cascades. Like the Wilson or Clemenceau arrays. They're convincing because they agree with our modern impressions, not because they're based on anything we can objectively call reality. A great tool for teaching college courses and a good research schema for historians interested in modeling their interpretations. But would I make life or death decisions based on the accuracy of the Clemenceau array's responses?" She grinned and shook her head.

I felt uncomfortable. "I'm sure the government doesn't base decisions on outcomes generators. Even sophisticated ones." But I knew better.

A year ago the U. S. government had changed its commercial and cultural policies toward China because of a profile developed by a system of computer-generated simulations and outcomes. The administration had withdrawn a trade compact and a non-aggression agreement in favor of a more modest method of rapprochement. The Beijing government reacted by mobilizing its military forces and blockading Taiwan for over a month, an outcome that hadn't even been reflected in the raw data beneath the profile. Eventually Beijing had backed down, but American foreign policy was in ruins and the credibility of the administration had been destroyed. My company got the contract to survey government AI capabilities and do a critical and technical analysis of decision-making procedures. I chaired a high-level evaluation committee along with a near-suicidal assistant director of the Central Intelligence Agency. Our conclusions were the same as Maggie's. The biases in the arrays and the matrices were subtle (in the biz, we call it *spoffing*), but the simulations reflected what government officials wanted, de-emphasized what they didn't want, and discounted what they wouldn't even consider.

"How do you program for human bias in an unbiased manner?" I asked the NSA adviser to the president. "You should've listened to the people who developed the system."

AI designers like myself now call it the interfacing uncertainty principle. To accidentally "Hal" an AI system or program—as in Hal 9000—is our big concern. It's more than an engineering problem. It's the point where psychology, physics, and information theory collide. How do you create an objective virtual reality and an AI that doesn't assimilate unwanted garbage from the designer, programmer, evaluator, or the user? The problem has been looming out there on the frontier for some time. Last year the United States and China nearly went to war over it.

I was sure that the toolkit Maggie and her colleagues were using was the same system, sanitized for unclassified use by the academic and private sector.

I smiled at her anyway. "I'm glad it's working out for you."

I stood up. "And I've got to go, babe. Lunch with Tanaka. Dunno what he wants, but he sounded down."

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"He's always down," Maggie said. "I'll walk you to your car."

Tanaka was positively grim. He's been running my company for nine years and I'd call him moody, but not like this. He ate his shrimp salad in silence and wouldn't look at me.

"Fitz and Linda are doing well on the Convergence Project?" I finally asked. Tanaka nodded, and I said: "I hear they've run into a glitch with the optronic-chemical interfacing. . . . Speed of light versus biochemical reaction, the conduit between the hardware and the human wetware. And if they get past that, they've identified a whole lot of other problems, too."

Tanaka nodded again and fingered his faded blue sweatshirt. "Problem is the user interface. Been that way since the beginning. Fitz and Linda say, we've engineered the hardware and the software, now let's think about engineering the user. In a way we've been doing that all along, psychologically, but now let's take a more direct approach. More physical. Could be trouble." And he fell silent again.

I waited for a minute and then I said: "Oh, come on, Keri! What's up? Have we been sued, or what?"

Tanaka sighed and hunched over his salad. "No, no. . . but I don't know what to think. It's going to change everything."

I sat back. He was starting to scare me.

"Have you ever thought about the . . . consequences of what we're doing, Alan?" he asked. "I mean, not what the consumer wants, or the glorious future we keep promising, but what's *really* going on?"

"Sure I have. I didn't know you were interested in all that."

"I am now." He took a deep breath. "Are you finished eating? Good. Our government friends have let us in on a secret. We've got a fat contract and they want you personally involved. Let's go."

"What?!" I stood up and followed Tanaka out of the restaurant, waving my arms. "Look, I've got too much to do already! I own the goddam company and I pay you to . . . hey! Are you listening to me?"

"Alan, shut up," Tanaka said, as he signaled his car from the curb. "You'll want in on this anyway. Or maybe not. I don't know."

The government building was forty miles out in the country, a five-story glass-and-concrete box with a big amphitheater projecting from one end. The lawn was green and well-tended, and the parking lot was mostly empty. No identifying signs. I noticed that security was very tight. Small cameras and smaller metal boxes, painted gray, were placed everywhere.

"I *hate* black projects," I told Tanaka.

He shrugged.

We were greeted at the glass doors by a man and a woman in yellow T-shirts and black windbreakers. Politely, they told us that our clearances had already been taken care of, and motioned us to follow. I scowled at Tanaka, but he wouldn't look at me. We walked down a long hallway. The rooms on either side—laboratory spaces—were empty, but the doors were open and the lights were on. There were a few people around. They stared at us with their hands in their pockets.

"It's set up to move personnel and hardware in here quickly when they need them," Tanaka explained. I didn't believe it. It looked to me like something big had been put on hold at the last minute.

The amphitheater at the end of the building was different. It was jammed

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with computers and communications equipment and a system of very sophisticated three-dimensional optronic projectors, the kind used for design, engineering, and *fx* generation. It looked like a deep-space tracking set-up with a big database retrieval subsystem. A lot of people were there, casually dressed. They stared, too.

The head of the project—whatever it was—was a man named Jack Shaw. He was in his early forties and wore dreadlocks, faded jeans, scuffed workman's boots, a blue oxford shirt and a conservative striped tie. He spoke rapidly with a Jamaican accent, but he was about as Jamaican as Tanaka. He was from Buffalo, and he had a thing for old Bob Marley music. He was a radio astronomer and he'd won the Nobel Prize a few years back for mapping and making sense of the large-scale structure of the universe. He was a flake, but I'd heard good things about him from the Internet technical news groups. Scientist-artist type.

"Welcome, welcome!" he said. "Mr. Tanaka! And this must be Dr. Asherwood, welcome, Dr. Asherwood, welcome! Have you told him why he is here, Mr. Tanaka? No? But that is probably best. We have a lot to talk about, Dr. Asherwood. This way, now!"

A brave front. I was unnerved, however, by Shaw's puffy eyes. He'd been crying. I looked around with that new perspective in mind and saw a lot of upset people.

End of the world? Cosmic catastrophe? Why was I here?

Shaw led us over to a large, glassed-in bay with a big table and a communications display. A few of the video panels showed scrolling data. Some of it looked like real-time telemetry feeds. Some of it seemed to be a variant of common hexadecimal computer icons, but weird, complex, and interspersed with stuff that I couldn't make sense of. Military? I'd never seen anything like it. One panel showed thermal, radar, and computer-generated images of a spindle-shaped object apparently in orbit above the Earth.

"Okay," I said. "What am I looking at?"

"This is Sam," Shaw answered. "Short for Samuel. Are you up on your Old Testament, Dr. Asherwood? Well, no matter, no matter! Samuel was a Hebrew prophet who stood on the walls of cities and warned the Jews about the wrath of God. Unless they repented."

Shaw and his people are hysterical, I thought. Tanaka, too. I had a bad feeling. *What's going on here?*

Aloud, I said, "I don't understand."

"Sam arrived nine days ago. He is standing on our walls now, so to speak, in an equatorial orbit forty thousand kilometers up. He's broadcasting, and unlike our Biblical brothers and sisters, we're listening very carefully."

"Say what?" But I was getting the idea: *Bad message.*

Shaw nodded enthusiastically and pointed up to the ceiling. "Outer space, *mon!*" he said and grinned maniacally. "Sam's a computer, an AI, and alien as all hell. Been traveling this way for more than thirty years at near-light speed, no joke! Puts his point of origin at a nice yellow star in the constellation Sagittarius. It's a *first contact* thing, don't you know?"

I stared at the spindle shape on the video panel.

"He's got a message for us," Shaw said. "And a damned disturbing one, too. We'd like your opinion about whether to take it seriously."

Shaw put "the Book" on the table in front of me and left me alone for a few hours. Tanaka gave me a hollow, anxious look as he closed the door. He

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seemed to be imploring me to do something. Anything. Tanaka was screaming with his eyes.

The Book was a hardcopy, a log of nine days of contact, along with a thousand pages of raw and partially processed data and a hundred pages of questions and theoretical and speculative commentary. Sam had been tracked by a military satellite. Almost immediately he had contacted a corporate computer network in Pacific Grove, California—not the United Nations, nor the United States government, nor even a human being. The network was owned by a designer-manufacturer of business software and virtual reality entertainment. The company also had a contract with the Department of Defense, however, and the network was under hard surveillance. When certain executables were run and a number of sensitive files were queried, the DOD quarantined the network and took over. Sam was discovered hacking into a fileserver. I began to understand Shaw's lively, hysterical humor, for Sam had been setting up a simple page on the world wide web: *Hello, I'm here.* The alien probe had responded to DOD security queries by sending an e-mail to the deputy director of the Defense Intelligence Agency. *First contact, mon!*

"How many alien civilizations are trying to make contact with us on the Internet?" somebody had scrawled on a page margin of the Book. It made sense. Sam was an AI who wanted to communicate. So it logged on to the most public network on Earth.

Sam's operational protocol was simple. In a "silent" universe the artificial noise broadcast from the solar system was hard to miss. Sam was supposed to seek us out and open a dialogue. It hinted that it had something to give us.

It was at this point that Shaw and his high-powered scientific team had started jumping up and down like excited kids. It was the same argument that had occasionally scoured the scientific community since Enrico Fermi's famous "where are they?" comment, or the Sagan-Tipler debate on extraterrestrial civilizations two generations ago. *Why* was the universe so silent? Was intelligent life so rare and the universe so immense that someone else's signals hadn't reached us yet? Shaw and the others had asked Sam: *Is* there anyone else out there, besides your people and ours?

The question had no meaning, Sam replied. The answer was both yes and no. By the time he finished clarifying, all hell had broken loose. Several of the scientists had tried to walk out, wanting nothing more to do with the situation. One had tried to commit suicide in an upstairs hallway. Another had suffered a nervous breakdown. The others were standing outside the glass bay grimly watching me read the Book, with their hands stuffed in their pockets.

I insisted on talking to Sam, even though the Book told me all I needed to know. The voice that filled the bay was light and expressive, like a child's. Sam wanted to be friendly and reassuring, but it also wanted to preserve the sense of "otherness." Nice choice.

"Hello, Sam." I said.

"Hello, Dr. Asherwood," the alien AI replied. "How do you feel?"

Good question. How *did* I feel?

"Sam, you have to realize that this is difficult news for us—"

"How do you feel, Dr. Asherwood?"

"I don't know how I feel, Sam."

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"I am glad that you are being honest with me, Dr. Asherwood. I am trying to be honest with you."

I glanced at Tanaka and Shaw. Just a few short sentences and it was already apparent that this AI was operating several layers deeper into the human psyche than I was accustomed to.

"All right," I said. "You talk first. I'll listen."

"Human beings are an enigma. No other people has ever behaved this way, and there are so many trillions. No other species ever presented us with such a problem, nor required so direct an intervention. Human beings are unique. Be happy with that."

"It's hard for us to react that way to the information you've brought us, Sam."

"Will you commit suicide or become insane?"

"Uh . . . no. I have a family. My son is four years old."

"I want you to accept what I have said, Dr. Asherwood. It is the truth."

"I believe you. But it doesn't help much."

"What will help?"

"Some other reality, Sam."

"We can provide that."

"Well, that's part of the problem."

It was. Our hopes about life in the universe had come true. And they had been dashed to pieces. The universe was brimming with life. And as empty as a gutted carcass. Our nearest neighbors were less than three parsecs away. And they were further away than the other side of creation.

Countless times in billions of years other peoples had taken the path that humanity followed: inventing a scientific community, reinventing social organization and intellectual perspectives, undergoing a commercial and industrial revolution. At the end of the industrial revolution lay the milieu of postmodernism: relativity, quantum mechanics, nuclear energy and evolution. And then the big one: a radical nexus that integrated advanced information theory, psychology, molecular biology, and an exotic new physics in which the relationship between information and causation added a powerful context to the properties of matter or energy.

Unsatisfied with the conditions that the universe had provided or the limitations imposed on them, countless peoples had learned how to engineer a separate reality. They decrypted the hyper-basal code of existence, and rewrote it for themselves. They teased bubbles of reality out of the quantum vacuum in a manner in which we might calculate the balances on a spread sheet or shape the software engine and the world-content for a complex computer simulation. They moved beyond the confines of a consciousness tied to the universe and struck out on their own, leaving only an anchor to their former habitat. Virtual realities writ large, the information content and conditionals far surpassing that of the universe itself. In weaving their own realities, they soon became aware of the countless others who had done the same before them. The universe became a museum and a cultural center, a place to come back to and wander for a time, to interact with others in old ways and perhaps to party a little.

From the end of the industrial revolution to the first experiment in reality engineering took a couple of generations. No one had ever developed interstellar space flight first; no one had needed to. The mountain had come to Mohammed in all instances: why go to the stars when you can "make" the stars come to you? From science to industrialization to information man-

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agement to creating the new corporeality, all in the space of a lifetime or two, a fugue, a cultural takeoff, a synergistic explosion, a radical phase-change of a people's ability, ingenuity and power. . . . I was on the edge of hysteria, just like Tanaka and Shaw. . . .

Because it hadn't happened that way *here!* Sam's bad message: Human beings are dopes! The dullest, most moronic, and uncreative—Oh, I am so sorry! challenged!—people in the history of the universe, bar none. Unique. Well, somebody had to be at the end of the line, right?

"Be happy with that," Sam had pleaded.

"At first, we thought that you were one of the rare sentient species who would not make the transition," Sam told me. "You would destroy yourselves or retreat into enforced stagnation and die off, as some peoples have done. Such a long time had passed since the liberation of nuclear energy and the development of your first advanced information management systems. We waited for the familiar upwelling of creativity and the first tenuous experiments toward altering reality. Or the end. But nothing seemed to be happening. So we investigated and learned that you had been on the verge of a scientific revolution over 2200 years ago in Greece. Again in the Islamic caliphates a thousand years ago. And in China several times. The industrial revolution should have occurred in your Roman Empire. Or in T'ang or Ming China. Or in Byzantium or the early Ottoman Empire. You weren't forty years late. You were thousands of years overdue. You kept missing the connections. We were dismayed."

"I'm still not clear why our . . . *uniqueness*. . . poses such a threat to you," I said.

"Perhaps not a threat," Sam replied. "An inconvenience. You could get hurt. We do not want to have that happen."

"All right," I said quietly. "An inconvenience."

"Please," the AI said. "This is a difficult situation for all of us. The problem is simple to understand. Human civilization has now reached a strange but fairly stable equilibrium. You will probably achieve the nexus that will lead you to reality engineering very slowly, over many centuries. Your own work, Dr. Asherwood, has helped to set your people firmly on that path. And yet a consortium of your governments are already designing and testing technology for interstellar propulsion and navigation. In twenty years you will send your first fast probes to nearby stars. In sixty or seventy years you may mount a colonization effort, despite the time and the enormous resources involved. That is why I have come. Frankly, we do not want you out there, blundering about. You would introduce a small element of disorder and risk that we are not prepared to tolerate. The universe is the bedrock, the lawn and the playground our condominiums sit on and we do not want you digging it up, even the infinitesimal part that you might explore in a few thousand years. But you can join us now. We can prepare a place for you. We can give you the technology to liberate yourself now."

"We have no choice," I said.

"No, I don't think so."

Great, I thought. The cockroaches of the galaxy, allowed to crawl around in a big glass jar, contained by compassion. Great. Get me a can of insecticide, instead.

I talked to Sam for hours. "Sure," I said to Shaw afterward. "I can see how the basic principles work. John Wheeler was trying to define something like this as far back as the eighties, when he asked how meaningful information

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can appear to modify the real states of macroscopic events. A lot of the best stuff has been done in the area of artificial intelligence and design simulation. We've already started revisiting basic issues in self-organization, algorithmic complexity, linear and non-linear systems, and downward causation, and everybody's been talking about the convergence of physics, biology, and information theory for decades. I suppose that if we weren't such a bunch of morons, we'd have put it all together by now. So I don't think that *thing* up there is jerking us around. It's probably all true."

"Ah, now, Alan!" Shaw said. "You're sounding like a very *bitter* man! You won't let it do that to you, yes?"

I can't help it. My son's bright, eager face haunts me. It's all my fault. I should have realized the truth before that damned alien AI got here. And I should have done something about it. I should have worked harder and been smarter. For my son.

I've been very stupid for a long time. I realize that now, as I sit here in the dark. We all engineer reality. Mostly by denying it, or by behaving as though it was something other than what it is. I've been playing at the edges of a shallow, sunlit pond, ignoring the shadows moving through the fringes of the vast forest behind me, trusting that the shadows, if they came, would play *my* game by *my* rules. Now it may be too late.

I key in the ignition code and the big truck vibrates slightly as the turbine spins up. I turn on the headlights and throw the transmission into gear. Gravel cracks and skitters as the truck moves slowly up the driveway. The small figure reappears in the window and watches for a few seconds. It waves excitedly and bounces away, no doubt making for the front door.

I'm going to do the right thing for my son, even if I'm not yet sure what it is. I have never felt this way before in my life.

I realize at that moment that my son's absolution and my true resolution is what I have always craved. From my core, I feel a sense of purpose and a peace welling up, enveloping mind and body, escaping, it seems, through my skin. The world around appears to glow.

I am out of the truck and bounding up the stairs to the deck ("Mooon!" he cried, and the moon is in the sky tonight, full and glorious), and I can't help myself, I am shouting now, and the deck light comes on and the door opens and my son darts out, stumbling slightly across the step in his excitement, and his dark hair is flying all about and he sees me and his smile becomes incandescent. His eyes crinkle at the edges in a way that tells me with certainty that we are together, heaven and earth, earth and moon, in both elation and grief. And I catch him and sweep him off his feet and into the sky in an arc that leaves us both breathless.

"Hey, bug," I say to him. "How's your day been?"

I know what has to be done. Clarity came in the instant that my son turned across the sky above me and I held on to him for both of our lives. Is this the creative upwelling that the AI Sam has told me about? A trillion ideas, a billion worlds, inside my head!

From an e-mail by Timothy Asherwood to his spouse, dated 14 April 2051:

Kamenev came by our laboratory on the campus today. He had a long layover between flights to Japan. He brought a complete data set from his op-

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eration at Moscow State University. He wanted to see what we were doing, too. We've pretty much found the same things. Kamenev's people have been tracking small changes in local physical constants, the rising density of events on the Planck scale, and the weird gauge field effects. They've been at it for a few weeks longer than you and I have. The Russians are very concerned about what it means. They want to go public. I said we'd have to talk about that. Kamenev was disappointed to miss you, but he may swing through San Francisco again after he's seen Hideki's project in Osaka. I told him you'd be home from the conference by then. We're going to have to reach some conclusions about the matter soon. Kamenev seems very frightened. You know what I believe, Kim. All of this is a manifestation of my father's work.

I finished the preface to Alonzo's biography of my father last night. I'd gotten stuck on it for awhile, until I went back to my father's diary and reread the entries from September 2019, especially the day he talked with the AI Sam for the first time. The preface fell into place after that. I outlined the transformative experiences that convinced my father to do something about Sam's message. I described how people and institutions and governments across the world had reacted in a surprising and positive manner, and how the creative upwelling that Sam spoke about had begun within a few months of the AI's arrival. I explained how my father learned that Sam's real purpose had been altogether different from what the AI had told scientists and government representatives in 2019. Far from being backward, Sam's creators regarded humanity as strange, gifted, and possessing a powerful but ambiguous potential. Sam had been sent to us with his cruel story to prick our self-image and thereby propel us across a threshold and into the next stage of development. And it worked. My father's stubborn efforts ignited a collective genius in humanity that we have always guessed was there. We are now well on our way to achieving what is expected of us.

The preface is fairly standard, Kim. You and I have heard it many times before. I speak about my questions and doubts only to you. They have become so strong. I believe what is in my father's diary until the day he spoke with Sam. I don't know what to believe after that.

My father was a lazy man. He was compassionate and a conscientious father and always attentive to my mother. But what others struggled for came easily to him. When he arrived home that night, he had changed. He was calm, but standing next to him was like being next to a blazing fire. It was not comfortable, and he and my mother had to make adjustments. But the marriage survived, and, in their last years, I believe they fell in love again.

My father always told me that I was the best part of his work. As a child, I would sit with him in the small duplex VR laboratory he had built in the house in Maine. He would talk to me as he worked. And unlike in his diary, his papers and files, and his personal communications, I believe he was completely open with me. He loved me and could not find it in himself to keep me in the dark. I remember a lot of what he said. It does not cohere with any history or biography, nor with the preface I finished last night.

Sam's message ignited my father's own genius by giving it a purpose and a sense of direction. My father became so *different*. As though something was unfolding inside of him that those who were close to him could not understand nor even fully recognize.

Think about it, Kim. What if Sam's original "bad message" was true? What if my father really had transcended the boundaries of our own back-

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wardness in 2019, a kind of metamorphosis none of us have experienced yet, in spite of what we've been led to believe? Wouldn't my father have done what any loving parent would try to do for an awkward and unfortunate child? Wouldn't he have created a new and compassionate reality for us, one that would hold us safe and reassured, and nurture us and allow us to grow until we can take our place in the larger community without fear or despair? What if Sam had decided to cooperate with my father? How do we know what they might have achieved? How would anyone suspect, except me? I have my memories of what my father told me when I was a child, you see.

Sam has been very reserved since my father's death last year. The AI hardly responds to anyone. I think it will talk to me. I would like to ask it about the truth.

I know what you'll say, Kim. You'll ask why I need to know. You'll tell me again that I've become different over the past few months, I've become driven. You'll say that if I'm mistaken about my father, that there's nothing to worry about. And if I'm not, then there's no way that I can change these things, and what my father and Sam have done for us will proceed to its designed end. In any case, you'll remind me that you do not want our child to be born this summer into a world of cockroaches.

I don't know how to answer you. But I can no longer deny what I feel. Perhaps this is what fathers-to-be sometimes experience, like a strange, confusing, metaphorical pregnancy, a sense of harboring life for a time and then liberating it, and the responsibility that goes along with that. I look around our laboratory and I read through Kamenev's material and our own daily data runs, and I put it all together in my mind and turn the information over and over and I give it a form, a substance, and perhaps a meaning, and I know that we and the Russians are observing the flux and calibration at the edges of my father's immense creation. I am so close to understanding what my father has done.

I've felt it for some time. Something surging, welling up to the surface. Each hour, the world grows clearer, brighter somehow. So many ideas, so complex, like worlds, crowding through my head. Kamenev is having similar experiences. Something is happening.

Do you feel it, too? ○

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WAYS TO TELL IF YOUR CAT IS A SPACE ALIEN

1. The cat has unexplained powers of hypnosis. And occasionally teleports when nobody is watching.
2. When you come home, the stereo is tuned to the dead space between stations. Even though you're sure that it was tuned to Easy Listening when you last played it.
3. The cat sits on your lap, and there's a bright light, and the next thing you know it's three days later; and you can't account for the past seventy-two hours.
4. You get mysterious phone calls asking for names you never heard of. The voice sounds like Elvis.
5. Your cat is interested in your old college chemistry text, and absorbs its content by sitting on it. Every few minutes the cat carefully turns to a new page.
6. Things in your house mysteriously disappear. Aluminum foil. Coat hangers. Household bleach. The magnetron tube from your microwave oven.
7. The cat sometimes seems to be trying to speak English, particularly simple words: "wow," "me," "now," "yow," "out!" and "isotopically purified plutoni-um-237 trioxide."
8. The cat has taken an exceptional interest in the satellite television dish. You think that this might be normal for cats, but *your* cat has rewired it, and aimed it at the Andromeda galaxy.
9. The neighbors complain about bright lights hovering over your house at night.
10. All cats are aliens. Why should yours be different?

—Geoffrey A. Landis

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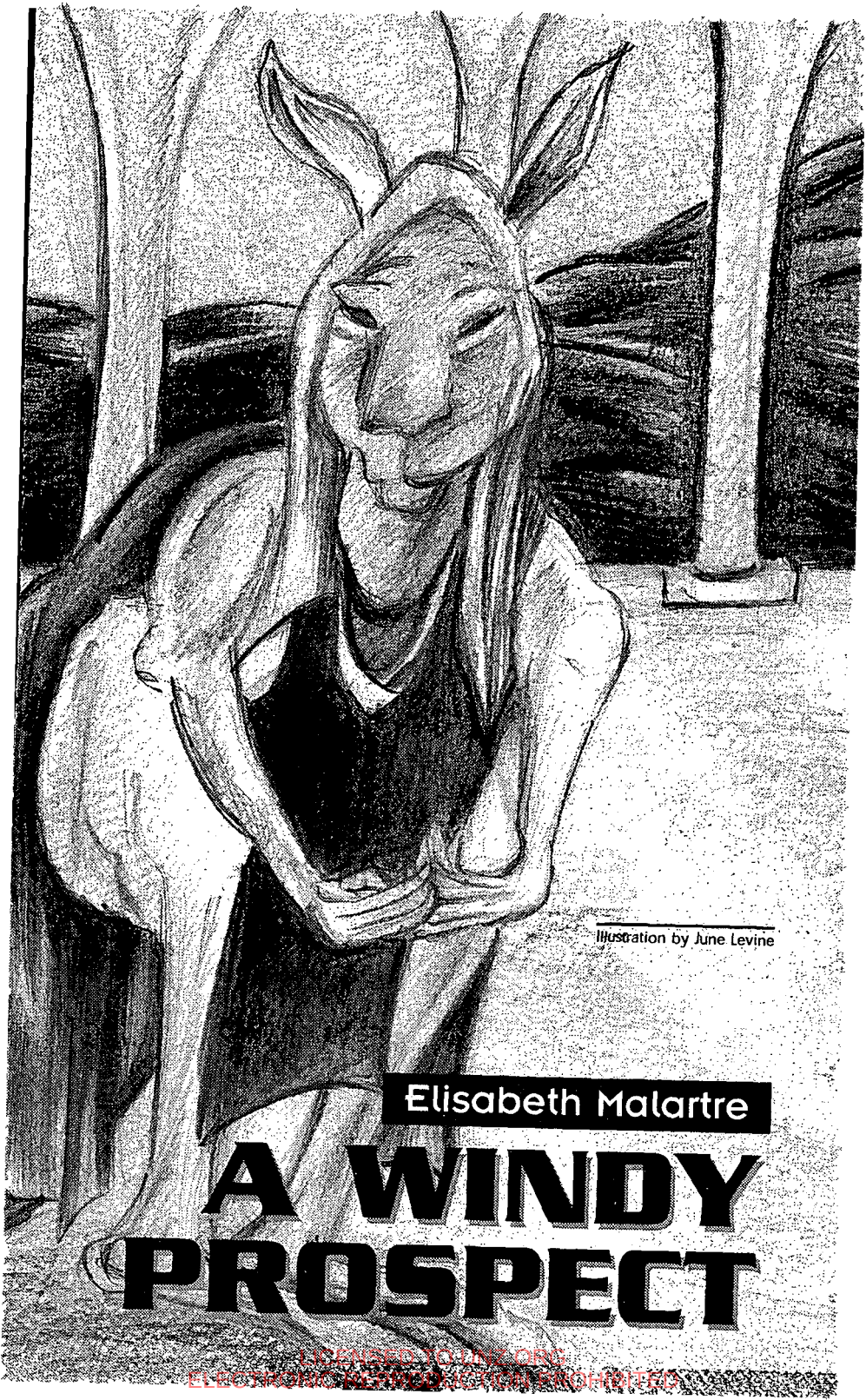

Illustration by June Levine

Elisabeth Malartre

A WINDY PROSPECT

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Elisabeth Malartre is a biologist, with a Ph.D. from the University of California at Irvine, who works as an environmental consultant and science writer. She writes a regular science column for a weekly paper, bringing biological theory down to the level of everyday experience. Currently, she's writing a non-fiction book about cyborgs and androids with Gregory Benford. Her fiction has appeared in *Nature*, *SF Age*, and *Asimov's*.

"Calm be with you, brother," intoned the Elder in the staccato clicks and chirps of the !Dran language. His head piece traced a graceful arc as he inclined his long neck.

"So long as the winds blow." Seymour Rogers gave the customary greeting in reply and bowed stiffly.

He shivered as he entered the meeting hall. The giant air blowers spun at top speed, pushing the chill morning air into gale force winds. He settled into one of the low chairs reserved for humans, strategically placed to avoid the worst of the wind. The !Dran were drifting in, muzzles up, always seeking the windiest parts of the room.

When they turned their muzzles into an air stream and closed their slit-like eyes in contentment they looked strikingly like the kangaroos of Seymour's native Australia.

"'Roos with clothes." He'd said to Genni soon after she arrived. "I have a helluva time trying to see them as something other than dumb animals that're gonna be road kill."

She'd bristled instantly. "They're not kangaroos, and they're not dumb. They're the dominant sentient species on this planet." She paused. "And I think they're quite attractive, especially the soft gold color of their pelt."

"Well, excuuse me. Where I come from, they'd be talking 'roos."

She sighed, adopted a didactic manner. "They're furred, upright quadrupeds with large hind legs and a heavy tail."

"And they hop, like 'roos."

"Yes, of course. But that's not special to kangaroos. Or Australia. Hopping is an adaptation for getting around on dry sandy soils. It's very efficient, actually. The tail acts as a counterweight. On Earth it evolved several times independently."

"Oh?" When he'd heard the Bureau was sending a woman to Windy, Seymour's fantasies had taken him in quite another direction from this schoolmistress-like lecturing. But Genni had made it quite clear from the beginning that she was a professional, there to do a job.

"Besides Australia, the deserts of North America and North Africa also have jumping animals. Kangaroo rats and mice in America, jerboas in Africa, and all the jumping marsupials in Australia." She paused. "As you know way better than I do."

It was hard to pick a fight with her, she was so sincere about all this native business.

She continued, "Maybe that's part of your problem with the !Dran—you don't see them for what they are."

"They're aliens."

"Not here. They're natives. We're the aliens."

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He sighed. Standard Bureau bullshit. Always side with the aborigines. Still, he enjoyed their discussions. Once the initial disappointment had passed, even a strictly professional relationship with a woman was welcome, after months of gruff male fellowship conducted mostly over the radio.

But she was right in one way. !Dran weren't 'roos. They talked, and somehow they were screwing up the mining operations of a multi-planet corporation. He hunched down further into his insulated jacket and hoped it would be a short meeting.

Seymour, a field systems analyst, was on Windy to improve the mining operations. Windy had become a problem at the fringes of Galactic's mining empire. After a promising start, the efficiency had steadily declined until they'd actually lost money in the last two years. Seymour's analysis didn't show a problem with the giant telerobotically operated mining machines, or with the transport, crushing or smelting operations per se, but some indefinable resistance was slowly grinding the system down. It had to be linked to the natives, but he didn't know how.

His bosses at Galactic were increasingly unhappy. Their last communication had been blunt: find out what the problem is by the next quarter. They would pull out if Windy didn't show a profit, and if Seymour was associated with a failure, he was finished. Galactic never gave second chances.

In desperation he called the Bureau of Inter Planetary Cultural Affairs, and they sent out a cross-cultural liaison in the person of Genni Cross.

Through the small gathering he spied a short figure in a bright red insulated jacket moving his way. It was Genni. She edged her way through the !Dran elders, handing out token gifts of food bars, and leaving a trail of bobbing headpieces behind her. The head pieces were like flexible helmets, covering the top of the head and most of the ears. Each clan sported a distinctive design and decorative style. Besides that, the natives wore only belts and short aprons that doubled as carry bags, made from the skin of a rabbit-like herbivore they sporadically hunted.

Genni was an attractive woman. Blue eyes set wide in an open face, a generous mouth, and cascades of honey-blonde hair, today pulled back in a bun as a concession to the wind. Too independent for Seymour's taste, thanks to his upbringing in a society rooted in a macho past. Barely two generations before, women couldn't call for an appliance repairman in Australia. In small bush communities like his home town of Katherine Gorge they were still restricted to "family" rooms in bars.

Old habits die hard. A woman on her own, and an attractive one to boot, naturally suggested to him a moral looseness. So he was irked by her "strictly business" stance. He guessed she thought of him as a typical redneck. She'd intimated as much. So much for cross-cultural liaisons. But they didn't have to like each other to get the job done.

Today's meeting was one of a series of get-acquainted sit-downs she'd started to meet the local clan elders. To improve attendance at station meetings it was standard practice to hand out small food gifts. And the !Dran were always hungry.

Feeding was one thing Seymour understood. Aussies had a long tradition of feeding native animals. It was a national reflex: see wildlife, offer bread. Unfortunately, feeding the !Dran only reinforced his biases toward them.

With brisk directness, Genni started the meeting. The !Dran squatted di-

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rectly on the metal floor, well separated from each other, their thick tails curled around for support like built-in bolsters. It was a very alien posture, reminding Seymour that they were not 'roos, whose tails didn't bend like that. Also, 'roos were herd animals, but the !Dran hated being cooped up together, and the sooner they could get outside again the better. Genni was a success so far because of her willingness to conduct very short meetings. Also, she was unfailingly cheerful. Seymour shuddered.

The !Dran elders were polite and attentive, as usual, and listened gravely to Genni's short introduction. She spoke the carefully correct version of the clicks and chirps the linguists had teased from the natives. She again described the workings of the Bureau, and why she had come to Windy. She was there, she said, to make better contact between the miners and the !Dran. She understood that between different races there were sometimes misunderstandings. Maybe they were still a little uneasy with having humans on their planet. But they had kindly taught humans their gracious language, an esteemed gift for which she was grateful. She would be their ombudsman. (A tricky piece of translation, this. He gave her credit for the effort.) She was there to solve problems as they arose. Was there anything she could help them with today?

The assembled elders appeared to consider her request. Their normally placid faces did not change expression.

No one said anything.

She tried again. Was there anything that could be better about the arrangements with Galactic?

No response.

Genni looked at him for help. He knew she'd been prepared for hostility, unhappiness, anger—anything but this bland acceptance.

Seymour sensed the first hint of frustration. She couldn't just let them go again without having some kind of dialogue. Finally she asked if they would like some time to talk among themselves. This was a sure bet because the !Dran never missed a chance to gossip.

Clicks and chirps rose to a roar. Genni tried to join the group nearest her, shrugged and came over to him. She smiled tentatively.

"Well, I got them talking, at least."

"Yeah, but what are they talking about? It could be anything. We'd never know."

"Don't you understand them either? I just assumed, because you'd been here for some time. . . ."

"Only when they chirp very slowly and emphasize each, uh, syllable. Between themselves they yammer so fast I can't tell one word from another."

Her eyes grew round. "But I understood the elders earlier."

"What we call elders are mostly those willing to take the time to talk slow enough so we can figure out what they're saying."

She looked at him with a vexed frown. "Damn! This is going to be worse than I thought."

"Yup."

She glared at him. "Don't be so smug. You're the one in trouble here."

Stung, he shot back. "Oh yeah? I thought the Bureau was going to send a wunderkind to fix everything."

"Everything you screwed up?"

"Whatever. If you can't fix it, the Bureau won't be happy with you either. So we're both in trouble."

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She started to say something, stopped. "This isn't getting us anywhere." She turned on her heel and stalked back to the !Dran.

Jump ship technology had arrived suddenly, transforming Earth's government and catapulting humans out into the galaxy by the mid-twenty-first century. Mining concerns like Galactic, hemmed in on Earth by environmental considerations, were among the first private interests to go off-world. But the miners were used to bribing human regulators when things went wrong, and were ill-equipped to do business with aliens.

After a few disasters like the Algol IV massacre, when panicked miners fired on a group of celebrating natives, and the narrow aversion of planetary war on Cetus A, the revamped United Nations/United Earth Government hastily set up the Bureau of Inter Planetary Cultural Affairs. It was mandatory for Bureau observers to effect first contact and to make sure the native cultures would survive trade with humans. Cross was a Bureau representative, under contract to Galactic.

In a fairly typical cultural clash, Galactic set up a standard off-world station, basically a set of metal buildings, as its headquarters on Windy. Then the !Dran refused to go inside.

The Bureau reps negotiated the Great Hall, with its cavernous ceilings, open arched windows and huge air blowers. In the process, a bargaining council of tribal elders was created where none had existed before.

Before the first shovelful of dirt was scooped, the !Dran culture was already changed.

Galactic's interest in Windy lay in its metallic ore, erupted in giant cockscombs over much of the planet. Geophysicists speculated that these were actually the remains of underwater hydrothermal vents, similar to those on Earth. Windy's plate tectonics were intermediate between Earth's continuing activity and a place like Mars, where all activity had died out three billion years before. Tectonics had wound down on Windy about a half billion years ago, dooming the biosphere to an irrevocable retreat. Without continuing volcanic replenishment, the atmospheric carbon dioxide ebbed, trapped by the planet's rocky mantle. Only the proximity of its star had so far saved Windy from a frozen death. When the shallow seas began their long retreat, the hydrothermal smelting ended, marooning the hot spots on dry land. Windy's overall aridity prevented the development of widespread deep soils and forests, exposing the metallic lodes on or just below the surface.

First hopeful of a cheap labor source, Galactic ran into a cultural stone wall. The semi-nomadic !Dran utterly refused to work in underground mines. They were willing to gather surface nodules, but only in exchange for food. However, Bureau policies absolutely forbade large-scale food transfers as too damaging to the independence of primitive native cultures.

Caught between two absolutes, Galactic had tried to break the stalemate for two and a half years. The conglomerate finally imported semi-robotic mining machines and a few humans to control them. They lived at four mining camps, scaled-down models of the station.

2

Seymour's beeper went off. He caught Genni's eye, pointed to the beeper, and made his way to the radio room.

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The call was from Hank Fowler, Camp 4 supervisor.

"Seymour here. That you, Fowler? What's up?"

"Fowler here. We had another goddamn accident this morning."

"Bad?"

"Bad enough. Sonofabitch was dragging a full ore cart at the time. The whole mess went over at the entrance to the crusher. Until we can clear it, we're dead in the water."

"How's the driver?"

"Not too good. Caught his tail in the outrigger as he jumped out. Medic looked at him, stopped the bleeding. Some of the other !Dran went to get a healer. God knows what this is gonna cost us."

Seymour groaned inwardly. An elaborate bargaining was about to commence.

What the !Dran did like about the mining operations were the crawlers used to pull the ore carts around. With the tops removed to satisfy the natives' mania for wind, the crawlers resembled oversized dune buggies.

The !Dran drove like reckless teenagers, careening the ore carts over the rough desert landscape between the ore extractors and the smelters. In the frequent accidents, the !Dran proved to be unusually nimble in escaping the tumbling vehicles, and injuries were few.

But overall, there were more and more accidents, and constantly replacing and repairing crawlers and carts cramped the schedule, increasing the red ink. So the mining engineers tried fitting a few crawlers with speed controllers. The !Dran tried so hard to override the mechanism they burned out two motors. Seymour suggested improving the stability of the vehicles, to tip-proof them. They welded a set of metal flanges on either side, sort of like outriggers. They told the !Dran this was for improved wind resistance. Fowler's bad news meant that the modified design had led to an injury.

After the first few accidents, Galactic had been very generous to the clan of the injured party, to avoid scaring off the natives. Now, whenever a !Dran was injured, even if he was clearly at fault, his clan expected extra food and gifts commensurate with his injuries.

Seymour suspected that Galactic had created incentives for accidents. But the data weren't there to prove it, and he didn't know how to stop it in any case. They needed local labor to drive the carts.

"Okay, Fowler. We've got most of the elders here at the station right now. I'll tell 'em. Then I'd better get out there and meet with his clan. What's his name?"

"Why don'tcha send the broad instead? No fair hogging her all to yourself down there."

Seymour bit his tongue. The men at the camps were all too aware that he was alone at the station with the only human female on Windy. He knew they were the butt of frequent ribald jokes.

Genni knew it as well. The separation between the station and the camps made it a lot easier for her to deal with the potentially uncomfortable situation. She told Seymour she preferred to work with the miners through him. One redneck was better than a dozen.

He considered his answer. Protesting that they had only a professional relationship would only make it worse. Who would believe him?

He opted for the light touch. "I would if I could, but, ah, that's not company policy, Fowler, sorry."

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Seymour returned to the meeting and signaled to Genni, who was chatting with a couple of the elders.

She was clearly unhappy with the news. "Damn. Well, let's see if we can salvage something. Let's try talking about it with the whole group."

But that proved impossible. All the !Dran wanted to know was who had been injured. When he was identified it became a private matter for his clan. The others couldn't talk about it; it was "*not proper*."

Furthermore, the two elders of the victim's clan requested a ride out to the camp and wanted to leave *immediately*.

With a sinking feeling, Seymour acquiesced. In the whole maddening situation the accidents were the only concrete problem with the natives that he and Genni had to work on. But it didn't seem to be much of a problem to the !Dran. They took all news with an unblinking calm.

The meeting broke up, after the customary flourishes and parting phrases. The !Dran were wedded to their rituals, and today was no exception, despite the professed urgency of the situation.

3

A short time later, Seymour and the two elders headed out toward Camp 4 in a long-distance crawler. He had carefully chosen a vehicle with an unmodified driver's seat so only he could drive. The two !Dran were draped over their backless seats, anchored by their tails behind the benches. Although their perch looked precarious, they were completely at ease, enthusiastic travelers. Seymour wrestled with the wheel as the oversized tires bounced over the uneven desert track that served as a rough road. Ahead stretched the ancient sea bottom of Windy, a series of low basins, dry pans, broken by rocky ridges marking the ancient tectonic plate boundaries.

In the pans low mounding shrubs hunkered down under the wind, growing at regular intervals. Looking like pale blue starfish, they were spaced from each other at the limits of their ever-thirsty root systems. Under their stiff, prickly branches hid the starchy underground mong tubers the !Dran subsisted on.

More tree-like vegetation grew in the flat washes that fanned out regularly from the ridges, hinting at underground water flows.

The roar of the engine and the ceaseless wind tearing through the open cockpit made normal human communication impossible. Seymour's ear protectors cut the noise to bearable levels. Decked out in aviator's helmet and goggles, he concentrated on the task ahead.

Through his sound attenuators he could hear clicks and chirps as his passengers managed to talk through the din. While he was now wearing headgear, their ceremonial head pieces were off and tucked into their carry bags. More reminders of how well they were attuned to the wind. And how different they were from humans.

With their ears uncovered, Seymour could see their unusually complex spiral inner structure. The early Bureau reps guessed it would increase hearing sensitivity, perhaps to compensate for the ceaseless background noise of the wind, but no one really knew what it was for. So they called it a "spiral organ" and left it at that.

"We don't even understand their biology, let alone their culture." Genni's

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words came back to him. They'd been sitting over coffee in the station soon after she'd arrived.

"What's unusual about their biology?"

"How they reproduce, for example. Ever see !Dran mating?"

"No, but I could say that about a lot of humans also."

She paused. He'd wondered if she might take it as a leading remark.

But she'd been purely professional. "Okay. Ever see a pregnant !Dran female?"

"Not to my knowledge." He paused. "Maybe it's a seasonal thing, or they keep them hidden, you know, some kinda taboo."

"See what I mean? Just a lot of maybes."

"What's so important? We know they reproduce because they have young, er, children."

"Not many, and the smallest ones don't look very strong."

"It's a tough environment. Not a lot of food. Maybe a lot of 'em don't make it."

"That's what I thought at first, but there are *more* older ones than young ones, and it should be the opposite. If a lot of them die in childhood, there should be more babies. Also, I can't prove it from the small sample I've seen, but there seem to be a lot at about the same age, about half grown, and far fewer in other age groups."

"Yeah, I think you're right about that."

"I hope it's not some side effect of our food. The Bureau wouldn't like that at all. But to find out, I'd have to survey children in outlying clans, away from Galactic's impact area."

"You may be in luck. Fowler tells me it's time to look for the next mining site."

"How far would that be from here?"

He pointed to a map on the wall. "The ore concentrations occur sporadically along the seams of what the geophysicists think are ancient tectonic plates. The station is located near the junction of three of the seams. We're moving out along all three ridges in a big circle from the station. Satellite recon shows there may be another metal outcrop about twenty kilometers or so from camp 3."

"Hm. That might be far enough for me, but probably not for your cultural problem."

"Why not?"

"With nomadic and herding desert cultures on Earth, word spreads quickly, even when settlements are scattered, but goods take longer. You need to find *pre-contact* !Dran, uncontaminated by the cargo cult Galactic has created. !Dran that are out of the loop. I only need to find unfed !Dran." She paused. "How much do they network anyway?"

"Well, there's nothing in the records to indicate that they get together in big groups, if that's what you mean. In fact, they seem to shun large gatherings."

"Hm. Desert caravans on Earth carried news to isolated settlements, and then there were the storytellers in medieval times."

"No caravans here—no herds, no beasts of burden, no domesticated animals at all."

"And we don't know if the !Dran have anything like an oral tradition." She sighed. "But according to the reports, after the shock of the first landing, every !Dran we met knew all about us. They must have some way of communicating."

* * *

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His passengers' clicks and chirps suddenly increased in frequency. He snapped back to the present and slowed the crawler.

"What's up?" he chirped over the wind to the affable !Tkai, sitting next to him.

!Tkai looked even more pleased than usual. He was sitting up, staring straight ahead. "Ro!go!he, I sense others of the clan ahead." The !Dran couldn't manage the "S" sound at all, so he used his last name when dealing with them.

Seymour scanned the empty desert landscape for signs of other !Dran. The crawler was crossing one of the low basins, blue mounds repeating monotonously in all directions.

They were heading directly into the wind, and a thick bank of gunmetal grey clouds had appeared on the forward horizon, roughly at the ridge. The clouds seemed to be moving toward them in a hurry.

"I don't see anything," he said finally. "Where are they?"

!Tkai tilted his head briefly, then gestured vaguely into the distance ahead. "That way."

It was useless to ask how far, as the !Dran had no quantitative measure of distance.

He tried again. "Are they near?"

"I sense them well." He looked back for confirmation to !Dgi!Dgi, the other passenger, who nodded her assent. Like !Tkai, she was sitting up straight, face forward, ears pricked up.

"Perhaps they are at Bonn!ho," said !Dgi!Dgi. "We may catch them there."

Up ahead the road would pass close to a large pool of water near the base of the ridge. Seymour estimated that the Bonn!ho oasis was about two to three klicks away, certainly not much closer.

How could they know that other !Dran were so far up ahead? Certainly not visually, and he doubted they could hear anything in all the wind.

That left smell or telepathy. No telepathic aliens had ever been found, and the !Dran weren't likely to be the first. As to smell, well, their noses weren't even quivering. He shrugged and kicked the crawler into gear again as the first fat drops of rain arrived.

By the time they reached Bonn!ho oasis in mid-afternoon the rain was falling steadily and Seymour was half soaked. This storm was much more substantial than the rain squalls he had seen so far that cut the oppressive daytime heat, but left little moisture behind. The !Dran appeared unconcerned by the rain. While not completely waterproof, their fur caused water to bead up instead of soaking in.

Standing in a small huddle under one of the oasis trees were three of !Tkai's clan, their headpieces wet but recognizable. Seymour turned to !Tkai. "Are these the persons you 'sensed'?"

!Tkai nodded. "My brother !Gai, and his sons."

Seymour nudged the crawler under the shelter of a clump of trees on the ridge side of the pool, where the vegetation was the thickest.

"Let's stop here for a while and wait for the rain to pass."

"Indeed. I wish to talk to my clan about the unfortunate accident," said !Tkai in the slow, formal speech the elders used in dealing with humans. He bowed slightly to Seymour, then incongruously climbed onto his seat and hopped out of the crawler, followed by !Dgi!Dgi.

Seymour sighed. This outing was going to Hell as fast as it could. !Dran were long-winded when conferring with their own clan, especially discussing accident settlements. He rooted around in the crawler boot until he

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found a torn rain poncho wrapped around a tool box. He put it on and tried to raise Camp 4 on the radio.

Nothing, just static. He tried the station; same result. And the rain was not letting up. Sheets of wind-driven rain lashed the surface of the pond, making waves that broke against the fringing reeds. The sky was dark grey in all directions, even back the way they had come.

No way to avoid this one by driving around it. And the worst thing was, he was getting hungry. He thought of looking in the crawler for emergency food bars, but then he'd have to share them with the ever-hungry !Dran.

Time passed. The !Dran talked on, moving deeper into the shelter of the trees as the rain increased. Seymour fiddled with the radio sporadically, more for something to do than with any hope of having it work.

By late afternoon he was wet, cold, and bored. Bureau be damned, he was just about to stomp over and break up their conversation when he heard a low rumble coming from the direction of the ridge. The rumble became a roar. A wall of grey-brown material rushed down the slope toward the oasis.

Mud slide! And headed right at him faster than a flash flood.

He heard yelling as he raced toward the crawler and leaped into the driver's seat. *He* was yelling.

The engine caught with a roar and he backed the crawler away from the sheltering tree. He looked around wildly for high ground—Christ, he hadn't even noticed that the crawler was in a wash! At the speed the mud was moving he had less than a minute to get out of the way. He started up the gentle slope of the wash, wheels spinning as the saturated ground crumbled under the weight of the vehicle. Worse, the crawler was actually sinking into the soft ground.

He gunned the motor and clutched the steering wheel. The crawler fishtailed and slid backward. He crammed it into lowest gear, adjusting his angle of attack to lessen the slope. The wheels spun. He eased off on the accelerator and tried again. The crawler moved slowly, stuck again, then suddenly grabbed hold.

It shot forward, whiplashing Seymour's head violently. But he was out of the wash and moving away from the mud.

He stopped the crawler at the top of the rise and looked back. Below him the wash was a river of mud and debris roaring toward the oasis pool. His neck ached and his whole body was shaking. His heart pounded so hard he felt sick to his stomach. He sagged back into the seat and suddenly remembered the !Dran. He fumbled for the binoculars and scanned with shaking hands. The tree had disappeared, swept away by a vast moving plain of mud and rocks. A roaring, churning disaster.

They were gone.

The first known accidental deaths of elders, and on his watch. What would they think of him? Of all humans?

He replayed the last hour in his mind, trying to see how he could have changed the outcome.

If he hadn't been so preoccupied, could he have foreseen the torrent? Warned them? He felt a sudden wave of remorse.

Would the !Dran hold him responsible? Would Galactic or the Bureau? The mud below was a metaphor for the deepening mire of his situation.

The return trip was a cold, wet nightmare that took over two hours. Seymour was soaked. He got colder and colder as the ride continued, the wind

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colluding with the rain to strip away his body heat. Finally, the temperature of his body matched the coldness in his soul.

Hunched down in the torn poncho, he remembered another miserable ride, down the side of Mount Waiealeale in Hawaii as a child. Then, as now, he had been riding in an open vehicle in the rain. He'd huddled with his brother in the back seat as they descended from the cool rainy summit. He remembered getting progressively colder and stiffer, the two of them lapsing into frozen silence. Then, miraculously, toward the bottom of the mountain they had broken out of the clouds into balmy summer weather. By the time they reached the highway, he and his brother were ready for ice cream cones.

He looked up at the leaden sky. No ice cream today.

4

It was almost full dark, and rain hammered steadily when he finally saw the station lights about a klick away.

As he approached, his headlights picked out little groups of !Dran straggling in toward the station. Chilled to the bone, he garaged the crawler and entered the station by a side door.

An unfamiliar musky odor hung in the air and all the lights seemed to be on.

As he passed by a doorway he peered into the Great Hall. Inside were several dozen natives. He guessed they were taking shelter from the storm.

!Dran of all ages were entering. As they crossed the threshold they shook themselves like dogs to fling the water from their pelts. Most had shed their sodden headpieces, but from their belt designs he recognized them as the clans from around camps one and two, the closest to the station.

They appeared as forlorn as refugees everywhere, their movements aimless and tentative. He thought of the elders, dead under the mud flow. How many others would perish tonight?

The musky odor was stronger in here. It was probably wet fur, and the ventilators pushed the smell throughout the station. It trailed him down the hall.

Genni met him as he turned into the living quarters wing. Her face was somewhat flushed, almost glowing. "I'm so glad you're back safe," she blurted out. "I was so worried." She searched his face. "You're almost blue from the cold."

Seymour grunted, afraid his teeth would chatter when he tried to speak. He half-turned and pointed back toward the Great Hall, speaking carefully through semi-clenched teeth. "The !Dran. . . ?"

"They started coming when the storm hit. They seem to think it's going to rain for some time, and the pans will flood. The station's on high ground. Sort of a metal cave to them, I guess. I couldn't very well turn them away."

"N-n-no-o, I g-guess n-not," he stuttered, giving in to the shivering.

She put her hand on his shoulder. "You're freezing, soaked to the bone. Go take a hot shower and I'll bring you something to drink."

He stared at her without speaking, surprised, then turned and stumbled off to his room, the musky air whistling after him.

The station had been built for functionality, with private sleeping rooms and communal showers. He stayed under the hot water for a long time. He was cold, hungry and beaten. Confusing images swam behind his eyes—dead !Tkai, moving walls of mud, Genni's smile. Finally the shivering

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stopped and he turned off the shower. Feeling like a half-poached rat he started back to his room, wearing nothing but his grey Galactic bathrobe and a pair of scuffs.

The hallway reeked of wet !Dran fur.

The door to Genni's cabin was open. He knocked lightly on the door frame and looked in. Across the small space she was bent over, rummaging through a drawer. He was astonished to see that the light in the room came from a number of candles.

"Wha . . . candles?"

She extracted a small bottle and straightened up. Her hair was loose around her face and she was smiling. "Oh, hi, Seymour. Come on in." She gestured with the bottle. "I've found something to help you recover from the chill."

"Maybe I'd better get dressed and come back." He started to back away, then noticed that she was no longer wearing her work jump suit, was in fact also in a bathrobe. "Is it something to drink?"

"What you have on is fine. Come on in before you get cold again."

He stepped across the threshold and into the room, feeling awkward. It was the first time he'd been in her cabin.

She offered him a cup of hot liquid and an energy bar. "Here, take these and sit down."

"Uh, thanks. I'm bushed."

He took a bite from the bar, suddenly remembered !Tkai. He told her briefly about the mud slide and the deaths. Her reaction puzzled him. He'd expected her to be concerned, even grieving, but she said little. She seemed to be preoccupied, and there was an odd glint in her eyes.

"Well, it's probably not the first time. In a storm like this, anything can happen."

She patted him gently on the back. "Don't worry about it now, you've been through a lot."

She brushed past him to close the door, leaving a trail of sweet scent. He had a sudden impulse to bury his nose in her hair. *Where did that come from?*

To cover his confusion he hastily sipped whatever was in the cup. And burned his tongue on the scalding liquid. "Ow! This stuff's molten! What is it?"

"Sorry, I thought you'd still be cold. It's an herbal tea. I microwaved the hell out of it."

"Thanks for the thought, anyway."

"You're more than welcome. Seymour, sit down, you look uncomfortable."

"Oh, sure, thanks." He looked around and crunched into the food bar. "Where'd you get all the candles?"

"In a storage cabinet in the kitchen. They're emergency lights, I guess."

He shook his head. "I can't imagine Galactic sending candles all the way out here."

"They're great, anyway." She gave him a wide smile. "I like how they flicker. It makes even this cubicle look mysterious."

A simmering pause. He slurped the tea gingerly. He couldn't quite place the flavor, but it was sweet and spicy and warming. Through it the odor of wet !Dran fur permeated the air. He finished off the energy bar and began to relax.

Genni patted the end of the bunk. "Sit down here and take off your robe." She slurred the words just slightly.

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"Ah, I'm . . . I'm not wearing anything else," he said hoarsely.

"Just loosen the top, then. I want to massage your neck and shoulders. It'll prevent stiff muscles from that cold, wet ride."

She drew out the last words, just the touch of a drawl in her voice.

Seymour looked at her sharply. *Where was the crisp professional? Off duty?* She seemed suddenly very soft and womanly, even desirable.

She waved the bottle at him. "Massage oil, just what you need."

Massage oil? Was this a seduction? Or was he reading something into this sudden friendliness? He took another gulp of the tea and sat down tentatively on the bed.

She moved around behind him and opened the bottle. Seymour tensed for the expected touch of cold fingers, but they were warm instead.

He sniffed. "I smell cinnamon."

She laughed. "It's a scented oil. Edible, too." Her expert fingers kneaded around the base of his neck.

"Oh, that feels good, it really does." He closed his eyes and let his head drop forward.

"That's right, luv, just relax into it."

Luv? She'd never called him that before. What was going on? He realized he didn't care. Time slowed. She worked along his shoulders and over his shoulder blades. The cinnamon mixed with the sweet smell from her hair cascaded down onto him. As his neck and shoulders relaxed, he became aware that another part of him was reacting in quite another way.

She slipped his robe off his shoulders and arms. Her hair brushed his shoulders. Her knuckles raked down his back in long, sweeping arcs. When he felt warm breath on his neck he turned to look at her. Her robe had fallen open, revealing pale firm breasts. She raised her head, face flushed, and looked at him. There was something feral in her eyes.

Suddenly she was in his arms and they were embracing ferociously. He fell back on the bed and pulled her down on top of him in a tangle of bathrobes. She straddled him with her legs, making little guttural noises deep in her throat as they kissed. He penetrated her in a single lunge and almost passed out in the rush of pleasure. He couldn't remember sex being this intense.

They rutted hungrily, insatiably, for what seemed like hours. In the flickering candlelight their writhing shadows danced madly on the walls. Seymour was dimly aware of the roar of the storm in the background.

Something was wrong. Seymour awoke with a start deep in the planet's night. The room was pitch dark, the air heavy and damp. Next to him, Genni was asleep, breathing softly. He lay still and listened, waiting for his brain to sort it out. He twisted around to look for the standard clock over the door.

Nothing.

No clock.

That was strange, all rooms had them. Then as he came more awake he realized that for once the station was quiet. Of course! No clock, no blowers—power failure. The generators must be out. He'd have to get up and look at them.

Genni turned over as he started to ease himself up. "Mmm?"

"Genni? You awake?"

"Mmm. Maybe."

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"Power's out. I have to go look at the generators."

She reached for him. "Come back soon?"

He bent down, found her lips in the blackness. "You bet." She responded with a deep, warm kiss. He nuzzled her hair and hugged her. He was surprised at how hard it was to force himself to leave the bed, caught by a surge of desire. He wrenched his thoughts to the generators, and got up from the bunk. Moving cautiously, he picked up the emergency flashlight hanging on the wall by the door.

"Okay, I'm on my way. Be back soon as I can."

"Mmm. Hope so."

He was halfway down the hall before he realized he was naked.

Sheepishly he returned to his room for some clothes.

A few minutes later, Seymour entered the broad main corridor of the station. As he passed the Great Hall he cut his light so as not to attract attention. The musty odor was quite pronounced, with the giant blowers stilled.

In the darkness he could hear the !Dran chirping and clicking softly.

He paused for a moment in the doorway, listening to noises of shifting bodies and some unfamiliar squeals and grunts. He wondered how many natives had come in overnight, and if he was expected to feed them.

The main generator was located in the back next to the crawler garage, in a covered porch open to the outside for easy refueling. Through this opening the force of the storm had reached the generator. Wet grit and bits of vegetation were plastered everywhere, on the walls of the porch and on the generator.

He shone his light outside into wet blackness. It was still raining, but the wind had dropped. A quick check showed that the tank was low in fuel, but not empty. Most likely there was water and grit in the system. Maybe only in the air intake, he hoped. He'd have to disassemble the manifold and clean it out, not something he could do in the dark with just a flashlight.

He checked his watch. It would start getting light in about two hours.

He straightened up. It could wait. He thought of Genni lying warm and eager, and he knew just what they could do to pass the time.

5

A muffled crash. He awakened, mind clouded with remnants of erotic dreams.

Grey daylight illuminated Genni's room from the single window above the bed. From the sounds he could tell it was still raining.

Crash!

"Did you hear that?" he asked.

Genni lay very still, startled eyes wide open. "Hope the station isn't coming apart."

"Doubt it. And there's nothing to fall on it either. We're out in the open."

"So what was it?"

"Guess we'll have to go look."

She disentangled herself and sat up. "Ohmigosh. Look at this room. What have we been doing?"

He put an arm around her, cupping her breast in his hand. "Don't tell me you don't remember."

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"Of course I do. That was rhetorical." She leaned against him. "Mmm. You feel good."

He leaned over and kissed her, intending only a light peck. Instead he felt himself falling toward her, almost unable to break away. Reluctantly he pulled back, looked into her surprised eyes. "Wow."

"Wow indeed. Either you're the sexiest man I've ever met, or there's something going on here that I don't understand."

Crash!

"Good Lord, it sounds like . . . I'd better get out there. If it's !Dran, no telling what they may be getting into.

They looked at each other. "The food stores!" Genni said.

Seymour struggled into his clothes. "Talking about food, I need some. In fact, I'm starving."

"Food *and* coffee." She rolled her eyes. "Do we have electricity yet?" She looked at the silent clock. "No, of course not."

"Uh, I was waiting for daylight to fix the generator."

"Damn. I'd kill for a hot coffee." She paused. "Okay, I'll see what I can scrounge for breakfast. Meantime, there are some food bars in the top drawer of the desk. Pass me one, will you? I've got to take a shower and repair the damage."

"What damage?" He looked at her. "You look beautiful."

"Thank you sir, but I fear lust has impaired your perceptions."

"Not at all. I'm very perceptive."

"Well, then you're just saying that so I'll sleep with you again."

"Which you will?"

"Most assuredly." She smiled her wide, suddenly very inviting, smile.

Seymour fought down images of her spread-eagled on the bed beneath him, smiling that very same smile. "Okay, no more of that for now. I've *got* to get out there."

He grabbed for a food bar and tossed one back to her, then rushed out of the room. He closed the door firmly behind him.

As he entered the hallway he could hear hammering noises coming from the direction of the storerooms.

Damn. They *were* going after the food. In the dim hallway something moved. He was surprised to see a young male !Dran come out of one of the unused bedrooms. They usually avoided enclosed spaces like the plague, and had never penetrated this deep into the station before.

He cleared his throat, chirped. "Uh, were you looking for something?"

The !Dran shuffled toward him without speaking, staring at the unopened food bar.

As he passed, he made a sudden lunge, tearing it out of Seymour's grasp. The hard, dense body sent Seymour sprawling against the metal wall and out of the way.

"Hey! Give that back, you bloody 'roo!" Seymour shouted at the retreating back.

Without thinking he picked himself up and started after the intruder. The !Dran's long hops took him quickly around a corner and out of sight. Seymour burst into the main hallway and stopped short.

There were !Dran everywhere, mostly young males, but some females and older adult males as well. The smell of wet fur was strong even though they didn't seem to be particularly wet. They stood in small groups, eyeing each

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other and moving restlessly. He heard low muttering. They seemed edgy and preoccupied. Seymour's first impression was of a gathering of young street toughs.

He looked more carefully for the source of his feeling. Their fur was unkempt, headgear askew or absent, their already minimal clothing mostly missing. Some of them sported what looked like bite marks.

Fighting? !Dran?

There were little shoving incidents, like school boys waiting for the morning bell.

He was amazed. Up to now, all !Dran had been unfailingly, even relentlessly polite, with each other as well as with the Earthmen. Their behavior was a series of elaborate manners and spacing rituals.

Overnight all that had changed. He suddenly remembered Genni. Things had changed for everyone.

He turned to the closest group, a group of three males, one of them clearly an elder. Maybe he could find out what was going on.

"Calm be with you, brother," he whistled.

The elder nodded curtly and looked away.

The hammering stopped. Seymour heard a loud crash, and cries of victory. The storeroom door must have been breached. The !Dran in the hallway turned toward the sound, and, pushing and shoving each other, moved in an unruly mob toward the food room.

Damn, Damn, DAMN.

He considered his options. He was alone and unarmed. Galactic had not provided him with weapons because the !Dran were not considered to be hostile, and there were no predators on the planet. Not that a hand weapon would do much good against a mob of that size anyway.

The food storage room had only been locked to discourage casual pilfering. Once inside, they'd find everything in easily accessible pouches: concentrated, dehydrated, or dried food.

Not even any decent cans to slow them down.

Damn. What he couldn't understand was why they hadn't at least *tried* asking him or Genni first.

His stomach growled. *Damn again.* He was hungry and going to be more so soon, he suspected.

Maybe a little diplomacy could salvage something. He followed after the crowd, adopting a confidant, determined gait.

As he rounded the bend in the narrow corridor, he ran headlong into a large !Dran carrying a sack of food packages. The native jostled past, shoving him roughly aside.

"Hey," he yelled, then realized he was speaking English.

He struggled to his feet, tried to walk toward the front of the mob. !Dran were moving in all directions. He tripped over a foot or a tail and went down again.

He desperately shoved his way up. The mob was a churning flow of furred bodies. He felt himself being crushed against the wall.

The press was so intense he couldn't take a breath. He struggled helplessly, pushing desperately against the hard, unyielding bodies.

Black clouds gathered around his visual field and he knew he would pass out soon if he didn't get some air. He was aware of some intense shoving around him, then the blackness swallowed him.

* * *

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He crawled slowly up out of the depths, a welcome lightness singing in his chest. He could breathe!

"Unh?" he croaked. He opened his eyes. Tried to focus. He was lying on the floor. Genni was sitting next to him. The station was quiet.

She looked at him anxiously. "Thank God you're back. I was *frantic*. How do you feel?"

He felt bruised all over and dazed. "Unh. . . ?"

"You *have* to do better than that."

"Wha. . . ?" He felt himself drifting off.

"Come on, wake up. Talk to me, Rogers." Her voice was strained.

Seymour opened his eyes and looked at her. She had a bruise on her cheek.

"You haven't been out long, luckily. The !Dran were very fast. They tore through here like a horde of locusts, cleaned us out in record time. I got here as they were carrying out the last of the sacks. I guess I yelled at them and one of them bared his teeth at me! When I tried to get to you they just about ran me down. Casually brushed me out of the way. Imagine! What happened to those friendly creatures? Then they grabbed the crawlers and headed off. One of the elders had stowed you in this corner out of the way of the mob. That was the only thing that saved you from being completely trampled. . . ."

He realized she was babbling, probably afraid. He was pretty shook up himself. "Unh."

"Come on, luv, you can do better than that. Here, try this."

She waved a cup of liquid under his nose. Warm, damp fumes tickled his nostrils . . . hot coffee! He reached for it with shaking hands, sipped. "Unh. Where'd you . . . get this?"

"They missed the kitchen, actually. Stupid station designers did us a favor, putting the storage room in a different wing from the cooking facilities. I never understood the logic before, but it sure worked this time. So we have a little food left."

He slurped the hot liquid greedily. "This is . . . warm?"

"I used a can of Sterno."

"Good girl." He looked at her. Tense and shaken, she was still damned attractive. "Help me up and we'll go exploring."

"I'm starving." She giggled raggedly. "Let's eat what's left before they come back."

They split up to reconnoiter the station. It was gloomy and dark without lights, but the wind had let up and it was raining only fitfully.

Without air blowers, the scent of wet fur hung heavily in the corridors and the Great Hall.

In the radio room Seymour read the logs from three of the four mining camps. Groups of !Dran sheltering from the storm overnight turning into raiding parties, going after food stores and stealing crawlers. The miners were generally okay, but edgy. They had managed to barricade themselves and protect most of their food, then a number of fist fights had broken out.

Most of the crawlers were gone, though, so they were effectively isolated from each other. A couple of the messages ended with crude references to him and Genni. Seymour shook his head. The jokes were escalating.

There were two messages from Fowler. The first was from last night, wondering why Seymour had not shown up with the elders. The second, from

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this morning, was in response to an alert from Camp 2 about the storm and the !Dran. Camp 4 was the farthest out. They had not seen any rain, and everything was okay. They were battening down just in case.

Seymour was puzzled. He checked the weather satellite data: the storm was not a continent-wide event. Rather, it was centered over the station and the close-in camps, moving slowly in the absence of the usual winds. Camp 4 would get it soon. He pocketed the message to share with Genni.

With the remaining power in the batteries he microwaved short messages to Galactic and the Bureau, but without much hope of quick replies. How fast a message got through depended on whether it was intercepted by a Jump ship and relayed. He could imagine Galactic's response anyway.

It was two months before the scheduled supply shipment. Now it would be an evacuation shuttle. If they survived that long.

Overnight the situation on Windy had turned from a marginal mining operation into a full-scale revolt. Who knew what the !Dran were capable of? He shoved aside the tiredness of defeat and concentrated on getting the station running again.

It took him the rest of the day to get the generator going. Against the wet gloom outside, the lights blazed cheerily. Even the noisy hum of the air blowers was welcome.

That night they collapsed into bed, exhaustion overriding everything else. But by first light they were passionately entwined again.

Behind Genni's enthusiastic smile Seymour sensed a bewilderment.

The next two days they worked steadily, hiding their little remaining food and barricading entrances in case the !Dran should return.

They radioed back and forth to the mining camps. No one had seen any !Dran since the raids. The Camp 4 workers had disappeared in advance of the storm and had not returned.

The messages were larded with dirty jokes. Seymour didn't tell Genni about them. No sense upsetting her more.

They worked apart mostly, trying to come to grips with their sudden mutual attraction. At first, Seymour found it hard to concentrate on anything else, but over the course of the storm the obsession and physical craving slowly diminished.

What replaced it was a deepening dread of his future. With no hope of pulling the operation out of its slump, he was finished in two months. What would he do? Become a mechanic on the ore ships from other planets? It was hard to think of anything else.

He wrenched his thoughts away from his growing panic and focused on their immediate situation: a handful of humans, spread out over a hundred klicks of desert, surrounded by a planetful of inexplicably hostile aliens.

They had to find a way to combine forces.

In the main garage Genni found a beat-up crawler that had been cannibalized for parts. When they had finished reinforcing the station, they ransacked the storage sheds and managed to find enough parts to make it run with a little judicious hot wiring.

Over meager meals, they worried.

"The thing I don't understand is the correlation between the storm and the change in their behavior," Genni said. "Why should they go berserk just because it rains?"

Seymour shrugged. "Don't have a clue."

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"And where are the !Dran going that they need crawlers?"

"They don't *have* anyplace to go besides the villages. And they're nothing. Just a few crude huts."

"Well, we *should* try to find out."

"Yeah, I suppose. Not that it'll make any difference. Who's gonna care? When Galactic packs up, no one will ever come to this backwater planet again."

She looked at him crossly. "Don't *you* want to know what happened? If I were hit by a two by four I'd want to know who was carrying it."

He stared at her. She continued, "You've been dragging around here for days feeling sorry for yourself. How can *that* help? Maybe we can solve this and turn the situation around."

"Okay," he said slowly. It dawned on him that losing Genni would be the worst part of leaving Windy. And he'd better do whatever it took to keep that from happening.

"Good. Let's get to work. I've been looking in the station records. They don't go back beyond six years, but there's nothing to indicate this kind of wet weather."

"Hm. 'Course, back home, that's not unusual. In the Australian desert it rains someplace every year, but you can't predict where. Any one place could go years without getting wet."

"Really? How do the plants and animals survive?"

"They kinda hunker down, I guess, and wait. When it does rain, all Hell busts loose. The bushes bloom, flowers all over, lots of bugs. Toads and birds singing night and day."

"Right, now I remember. There's one glorious spring of flowers and fruit and reproducing. Then the plants set seed, and the animals go underground to wait for the next time."

"Something like that."

"That gives me an idea. Windy is a desert. If it's the same kinda story here, maybe the !Dran are caught up in the cycle as well. And their crazy behavior . . ." she looked at him intently, ". . . is how they reproduce."

"Could be. But 'roos mate pretty much anytime, and they live in dry places."

"Okay, we don't understand how the !Dran breed, but that's because we've never seen anything like mating or pregnancy. Maybe this explains why. They only breed when it rains."

"In a desert? No wonder they're grouchy."

"No, seriously—"

He didn't see it. "They're animals, not plants. Getting wet makes them horny?"

She shook her head. "No, it can't be that. Look, I only minored in biology before getting into psych, but even we cross-cultural envoys know that behavior doesn't change without some kind of stimulus. The question is, what was the stimulus?"

"Maybe they were hungry."

"!Dran are always hungry. And there's another thing . . ." She bit her lip, hesitated. "Well, what happened to us."

Seymour stared at her. "What was that?"

"I mean, most of the time I feel like a rabbit in rut, or we're in the sack screwing like weasels. We didn't even *like* each other last week. It's fun, but it just doesn't make any sense. Especially coming on so fast."

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"You mean . . ."

"Right. Whatever turned the !Dran into a mob did something to *us*."

6

With the suddenness of desert storms, it was all over. They awoke one morning to sunlight pouring through the window.

Genni was ecstatic. "Let's get outta here!"

She bolted to the kitchen and hastily prepared breakfast from their dwindling supplies.

Seymour trailed after her. He sensed that his life was changing in ways he couldn't control. It was unnerving, and he wasn't ready for what was coming.

Nevertheless, he hot-wired the battered crawler and they headed off in the general direction of Camp 1.

The hard sandy surface was dark and soaked, and in the distance they could see water glinting in the flooded pans. The last of the clouds scudded away behind them, driven by the prevailing wind.

Through his preoccupation, Seymour saw that something was different.

The desert was transformed. At the edge of the first pan, he stopped the crawler. In place of the monotonous blue mounds was a riot of color. The desert shrubs were blooming!

They got out and stumbled down the gentle slope into a field of flowers. Dark blue leaves surrounding small pink blooms topped the mounds. At odd intervals clusters of large crimson trumpets protruded from the pink flowers. A carpet of shorter plants bearing blooms of various colors covered the desert floor between the blue shrubs. Small flying creatures zipped among the flowers.

"Wow. Wow," said Genni. "The Bureau biologists would *love* this. It's a whole new ecology. These plants are totally unknown. The seed must just sit in the ground waiting for rain. And those bugs, or something, what *are* they? Where's that vidcam? I'll have to record it and take samples, but for now, I just wanna enjoy it." She stretched languorously.

Stirred, Seymour started toward her, but a strong sweet smell stopped him. He sniffed at the closest mound.

"Where's the smell coming from?" he asked. "The pink ones don't smell."

Genni bent over and sniffed. "It's the red ones. Wow, what amazing perfume! These flowers make me feel good just smelling them."

She poked her hand into the shrub to pick one. "They come from *under* the mounds. Of course! These must be the mong flowers! This is where the !Dran find the tubers." She picked several of the mong flowers. "The smell is so gorgeous, I've just got to have a few of them." She cradled them carefully in her lap and they were off again, sailing across a blue sea of color.

Everywhere the desert bloomed. Between the splashes of color, the bright warm sunlight and the sweet scents, Seymour felt his gloom diminishing.

After an hour, there was still no sign of the !Dran. He stopped the crawler. "I think we'll head for a place where there are some caves in the wall of the ridge. They may have wanted to shelter from the storm."

"Okay. Any place *we* can hide when we get there?" She shuddered. "I don't think I want to run into a mob of them just yet."

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They turned off onto a faint track that was soon engulfed in flowers.

"Hope you can find the way. Everything is so overgrown."

"I head for the shorter flowers. Plants in the track are more likely to be stunted."

Within a few minutes they found the first of the crawlers, lying on its side in a small ravine. A litter of empty food wrappings fanned out around it, mired in the wet soil.

"Good call," said Genni.

"Not real neat, are they?" grunted Seymour, slowing the crawler.

"They came, they conquered, they littered. I hope no one was hurt."

They passed by without stopping. Half a klick further along, they spied the first !Dran in the distance, a tawny patch amidst the blooms. Once they found the first one, their eyes quickly picked out another and another. The concentration increased as they entered a narrow valley leading to the caves. There were !Dran everywhere—sitting, standing, browsing in the bushes, rough-housing, lying around.

As the crawler approached the gathering, Genni gasped. "There must be hundreds of !Dran here. It looks like a mega cousins' get-together." She turned to him. "You said they didn't gather like this."

He shrugged, shook his head. "Uh, they don't. Didn't."

Uncertain of their reception, they stopped the crawler on the top of a low rise and scanned the group with binoculars.

After minutes of intense watching she said, "The clans are all mixed up. Look at all the different headpieces. Hm. Where are their aprons—oh."

"Uh-huh." Adopting a deep, insinuating voice he said, "Notice anything else?"

The closest !Dran sported a bright pink member hanging down from beneath the curve of its belly. Nearby was an individual with a distinctly rosy flush to its under tail area.

She stared at Seymour, eyes wide. "They look, uh, sexy."

"Nice way to put it."

"Well, you can sure tell the sexes apart without looking at their headpieces."

He laughed. "You mean, they look like horny 'roos."

"They sure do. The males must carry their sex organs up in the body cavity. For some reason they're now protruding. And the females look like some of those apes on earth with big red targets."

"Rutting season, as you suggested?"

"Seems like it."

"Something else is different. Look at their ears."

"They're . . . bushy, or something."

"Not 'bushy,' it's their spiral organ. Either they've folded back their ears and uncovered it, or it's enlarged."

"Spiral . . . organ . . ." she said slowly, "oh, yes, that stuff in their ears. I didn't know it was a separate organ."

"No one else did either, until now."

"They look like little TV antennas sticking up out of their heads. No, that's not quite right—more like bottle brushes."

"Hey, what are those two doing over there?" Seymour pointed to a spot on the edge of the gathering. Two tawny forms were rolling about in the low shrubs.

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They watched for several more minutes. Finally Genni broke the silence.

"Well, now we've seen !Dran mating. I feel like a damned voyeur."

"All in the cause of knowledge . . . uh oh, we've attracted attention." Several of the nearest !Dran were staring at them, then one started whistling back to the center of the crowd. The humans couldn't pick out individual words, but it was obviously an alert.

They scrambled back to the crawler.

"We're out of here," Seymour said, restarting the motor. "I don't want to chance an incident. Maybe what we saw was taboo to outsiders."

Genni touched her fading bruise. "Yeah, they look pretty relaxed, but who knows what they'll do?"

She was quiet on the return trip. Seymour could almost hear the little wheels grinding in her head. She rode most of the time with her nose in the mong flowers, deep in thought. Arranged in a large bouquet, they later filled the kitchen with their perfume.

Over a meager dinner he finally said, "Penny for your thoughts."

"I'm still trying to identify the behavioral trigger. Tell me again about that trip you took just before the rains. How did the !Dran know in advance that you were going to find that other group?"

"Haven't a clue. We were too far away to see them, and the wind was very loud. They couldn't have heard them."

"Did you ask !Tkai?"

"Yeah, he said he sensed them."

"What word did he use?"

"*Knu.*"

"That's the word for smell."

"Not literally."

"Which way was the wind blowing?"

"Straight at us. It's bloody uncomfortable driving with them because you have to fold the windshield down."

"So you were downwind of the other !Dran."

"Yeah, but the distance . . ."

"On Earth, male moths can detect female pheromones on the wind down to the level of a few parts per billion. They have fancy antennae that comb the particles of hormone out of the air. Then they fly upwind to find the females." She paused. "What if the spiral organs are scent detectors?"

"Why would they need 'em?"

"Well, the !Dran evolved in a windy, dry place. They can't grow crops because the conditions aren't right, so they're stuck in a hunting and gathering economy. They have to scour the landscape in small groups to find enough food."

"Yeah, they're pretty skinny, for sure."

"So, how do they keep in touch with each other, or know how to avoid places already visited by another group?"

He caught her drift. "By scent?"

"Well, you have to admit that knowing in advance that a place is likely to be stripped is more efficient than going all the way there and then being disappointed."

"Hm. That's ingenious. But why are their spiral organs distended now? All the local clans are together. Who's left to smell for?"

"Well, it *could* just be hyperstimulation, but I think it's part of their sexu-

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al transformation. And if I'm right, then maybe the behavioral trigger is a hormone."

"A sex hormone?"

"Possibly. Remember the musky smell we had in here during the storm? Maybe it wasn't wet fur after all. Then when the air blowers failed it magnified the effect."

"I'm listening."

"Look, what we've seen is a culture that exists in conditions of chronic scarcity broken by occasional good times. !Dran clans are a spacing mechanism: they have food-hunting territories because the food is scattered. So they live in small foraging groups, the villages. They can't afford to waste time in a place that's already been harvested, so they leave scent clues for others. Those things in their ears . . ."

"Spiral organs."

"Yes, they must be scent antennae. That's how they keep track of who's where."

"Okay, so what happens when it rains?"

"Well, the plants grow wildly and the small animals they hunt reproduce. Suddenly there's lots of food, and clan separation breaks down so all can harvest in the fertile area. It's a way of sharing the wealth."

"And genes."

"Yes, yes, of course," she said excitedly. "They shelter from the rain in large groups and the breeding hormones take over. That way, the females get pregnant when there's a flush of food. *And* they have a wider choice of mates than in their small groups, which reduces inbreeding. . . . The flip side of it is that during scarce periods they wouldn't want to breed. I haven't worked out yet how they do that."

"Maybe they use the wind to blow their scent away." He gestured in the general direction of the Great Hall. "You know what wind maniacs they are. They wouldn't come into the station until we installed those damned air blowers."

"You're right! I like that. It's a nifty explanation."

"So how do you intend to prove it?"

"Not tonight, for sure." She yawned. "I'm going to bed." She looked at him with a wry smile. "And strangely enough, tonight I actually feel like using the bed for sleeping."

Seymour was surprised to find that he agreed with her.

And not only that night. As suddenly as it had come, their overwhelming passion died.

A couple of nights later, Seymour found himself in his own bunk. Lying awake and alone, he bleakly contemplated the future. Ending the physical relationship with Genni had spiraled him deeper into a black depression. Another failure . . .

Confirmation of their hypothesis came a few days later from an unexpected source.

Digging through the original planetary biology survey, Genni found a gas chromatograph analysis of local plants. One of them was the mong tuber. The Bureau biologists had noted a hormone-like substance similar to a female !Dran hormone. Not being in the plant business, Galactic had never made any use of the information.

Seymour was dourly working on the generator, elbow deep in grease and

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grit, when he heard Genni's shout. She burst into the shed, face flushed. Her smile lit up the gloom.

"It was here all the time!"

"What?"

"The missing piece of the puzzle. The mong plant makes a steroid."

Seymour looked blank. "Oh?"

"A sex hormone, luv. It must work as an anti-testosterone, or anti-whatever the !Dran pheromone is. During drought times, the !Dran eat a lot of mong, which inhibits their sex drive. But when it rains, the pans flood and they can't get any more mong. Plus the prevailing winds fail, and the !Dran are crowded together in caves. So the pheromones build up. The combination transforms them into reproductively active creatures." She looked at him carefully. "The hormone must be in the mong flowers as well."

"Oh? Why do you think so?"

"That sweet-smelling perfume certainly cooled some super-heated libidos around here in a hurry."

"What, you think it was the flowers. . . ?"

"I believe I just said that."

"Hm. I assumed we just ran out of juice. Too bad about that."

She looked at him thoughtfully. "Not if it was all phony."

There was something in her voice that he couldn't quite catch. "Uh, isn't it weird for plants to produce sex hormones?"

"It's not unknown. On Earth, wild yams produce steroids. Women used to eat them to ease the symptoms of menopause."

"What's in it for the plant?"

"Well, maybe a way to interfere with the reproduction of animals that chew on them, like insects."

"So hormones made to stop insects work on humans?"

"Seem to. Life on Earth is pretty unified."

"Okay. But how come the !Dran pheromone worked on us? We're not from Windy!"

"Good question. We seem to have stumbled on a universal aphrodisiac."

There was a little pause.

"You sure about this?"

"I just wish we had a bigger sample. It was just the two of us, and there'll be questions. . . ."

He remembered the radio messages. "Uh, it also got to the miners." He told her about the obscene jokes, the fist fights.

"Why didn't you tell me this before?" She was clearly irked.

"Well, I didn't want to upset you. . . ." The words trailed off. He looked at her glumly.

She shook her head, exasperated. "Damn your protective instincts, you red-necked Aussie! I needed that data. I've been worrying myself sick that there wasn't enough proof to make a claim."

"Sorry."

"Forget it. I'm too pleased with myself to be really angry."

She started to laugh. "Maybe we should send them some flowers to show we're not offended."

"Wha??"

"The antidote, luv."

Seymour stopped fiddling with the manifold. "Jeez, you're right. What a gold mine that would be to . . ."

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Genni beamed. "Yep, I suspect Galactic Mining is going to diversify into pharmaceuticals. This is a much bigger find than all the ore on the planet."

Seymour turned over some ideas in his head. "I may still have a job after all. Maybe even a bonus."

"Think bigger. The discovery of the mong steroid was made by Bureau bio-logists. And the co-discoverer of the !Dran pheromone is me, also a Bureau rep. There's a tiny clause in my contract to Galactic that covers an 'incidental' discovery. After all, it has nothing to do with ore mining. I intend to file a proprietary claim on this in both our names. The Bureau will probably license the development back to Galactic—but that's fine, because we're the discoverers and we're already here. They'll send in biochemists to isolate the active hormones, but there's plenty of field work yet to do right here. So, if you can stand working a while longer with a liberated woman, it looks like *we're* going into pharmaceuticals also."

Realization of what she'd just said burst his gloom like a bubble.

"Hell, yes, I could stand it. How 'bout we have another whiff of that hormone?"

She walked over and put her arms around his neck. "Not for us, lover. Not this time. We're going to do it the old-fashioned way." O

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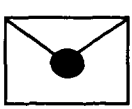

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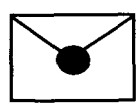

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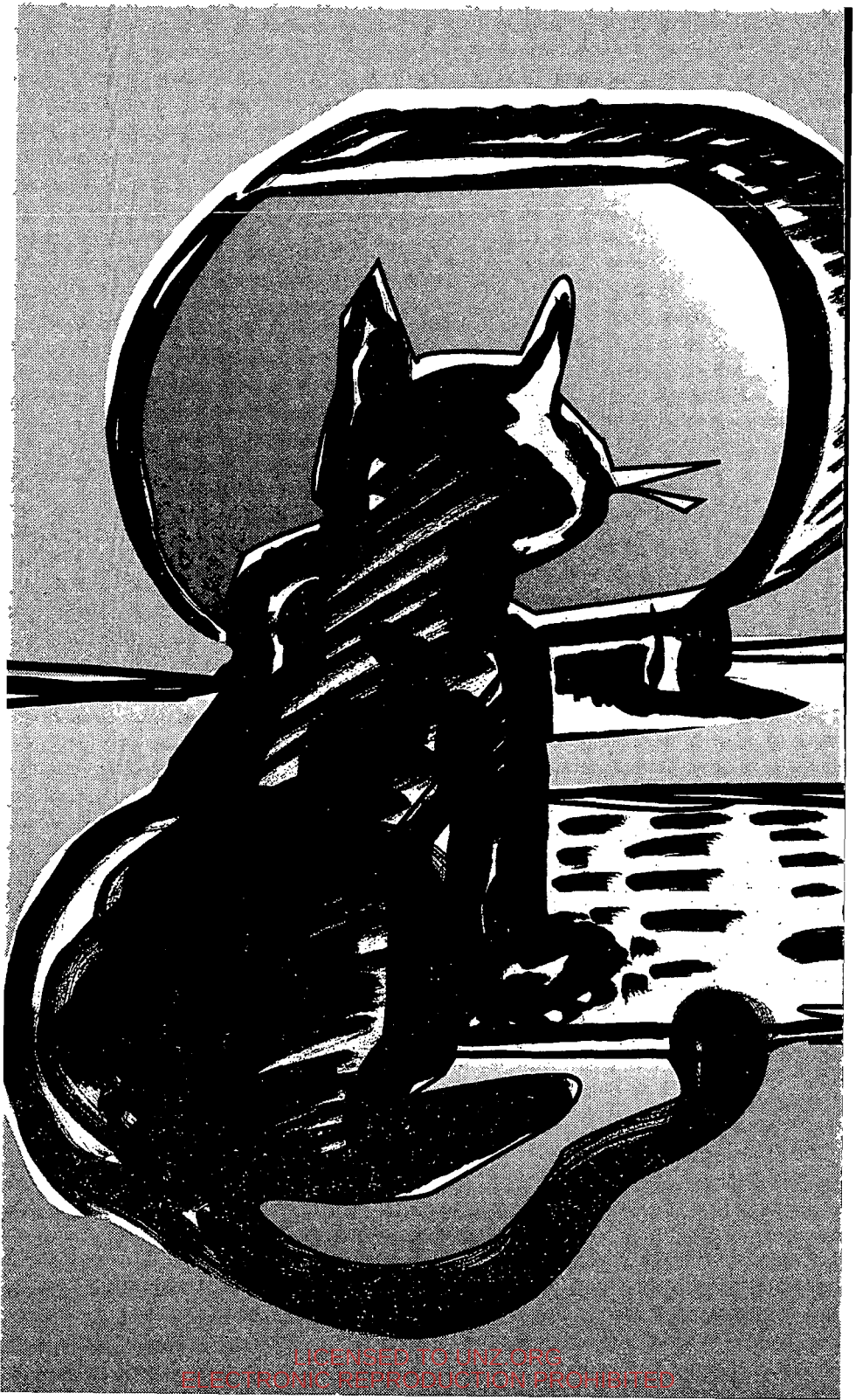

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MY CAT

S.N. Dyer

Illustration by June Levine

S.N. Dyer is a physician who, under various names, has published over sixty stories and a collaborative novel. The author lives in Chattanooga, Tennessee, with some rather unusual pets.

My cat is writing a novel.
Strange.
She doesn't talk much, so I didn't think she had anything to say.

I thought she just liked to lie on the foam wrist thingie and walk on the keys to get my attention. I guess that shows me.

She asked what I thought. It's not like when someone at work insists you read their second cousin's manuscript. You can't tell your own cat "This sucks. Don't give up your day job."

I said, "It's not publishable as it stands. But it's excellent for a maiden effort. And it sheds a lot of light on the heretofore mysterious world of middle-aged polydactyl feline angst."

I'm starting to approve of the novel. She's perked up since she began writing. No more me leaving the house at seven A.M., she's on the couch; me coming home at nine P.M., she's still on the couch.

We got into an argument, though. I was tired and just wanted to veg out and play video solitaire. She wanted the computer to check her e-mail.

I didn't know there were websites for six-toed cats who write.

I bought generic cat sand. She deleted *my* novel from the hard drive.

I don't think it was an accident.

The second draft is pretty good. But the obnoxious human comic-relief character hurt my feelings. I asked, "Do you really think I'm that horrible?"

She acts like I shouldn't be upset. Like it's not really me because the char-

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acter has short blond hair and mine is long and dark. I'm a writer. I know the tricks.

Is my singing Delta blues in the shower really so bad?

First, my agent took her on as a client. Then, he auctioned the book. I can't believe it! He never sells *my* stuff!

I'm feeding a couple of strays outside. She's so intolerant. Writes a short story where all the other cats on earth succumb to a space virus and she becomes Secretary General of the U.N. *Asimov's* buys it without asking for revisions. Makes it the cover story.

I guess she's on a roll.

I took her to the vet for her shots. Everyone wanted her autograph.

She's been on Letterman and Leno. Sat on Mel Gibson's lap. Said it was to get a laugh. Gets marriage proposals from strangers. Boxes of catnip mice from European admirers.

I told her, "You don't want anything to do with people you meet on the internet." She acted snooty. Okay, so we met at the pound. I'm not proud.

She thought she was being stalked, but it was just the neighbor's dog getting into the garbage. Called the cops on him. Later someone knocked down our mailbox. It's not hard to guess who.

So she's getting too important for me. Except yesterday. There was a loud thunderstorm around three A.M. Suddenly she's all "Oh, I'm so tiny and purring and pitiful, protect me." Yeah.

I can't believe it! She's left me. For my *agent*.

I hope they're happy. Let *him* deal with her little sandbox problem.

I threw out all her toys and the bowls with her name, burned her scratching post. She wrote for me to send her stuff. Too late, kiddo.

One of the strays has moved in with me. His name is Harlie. He has no literary pretensions. In fact, he has no interests at all except tuna, catnip, and sleeping in front of ESPN. Sometimes he burps up hairballs. I can live with that.

I thought Harlie was just scratching on the furniture. No. He's taken up *sculpture*. The back of the couch is now a bas-relief of the Last Supper, with Judas as a rottweiler. I came home today and found that he was having a show. Wine stains, cheese crumbs, and he's donated my desk to a charity auction. It was a pointillist rendition of the martyrdom of Saint Catherine under a motorcycle wheel. I thought he'd given it to me.

My next pet is going to be a fish tank. Empty. ○

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Brian Stableford's fiftieth novel (and seventy-fifth book), *Year Zero*, was released last June by Sarob Press. It was followed in October by the Warhammer novel, *The Wine of Dreams*, which was published by Games Workshop's "Black Library" under the pseudonym Brian Craig. His future history series from Tor, so far consisting of *Inherit the Earth* (1998), *Architects of Emortality* (1999), and *The Fountains of Youth* (2000), will continue in 2001 with *The Cassandra Complex*.

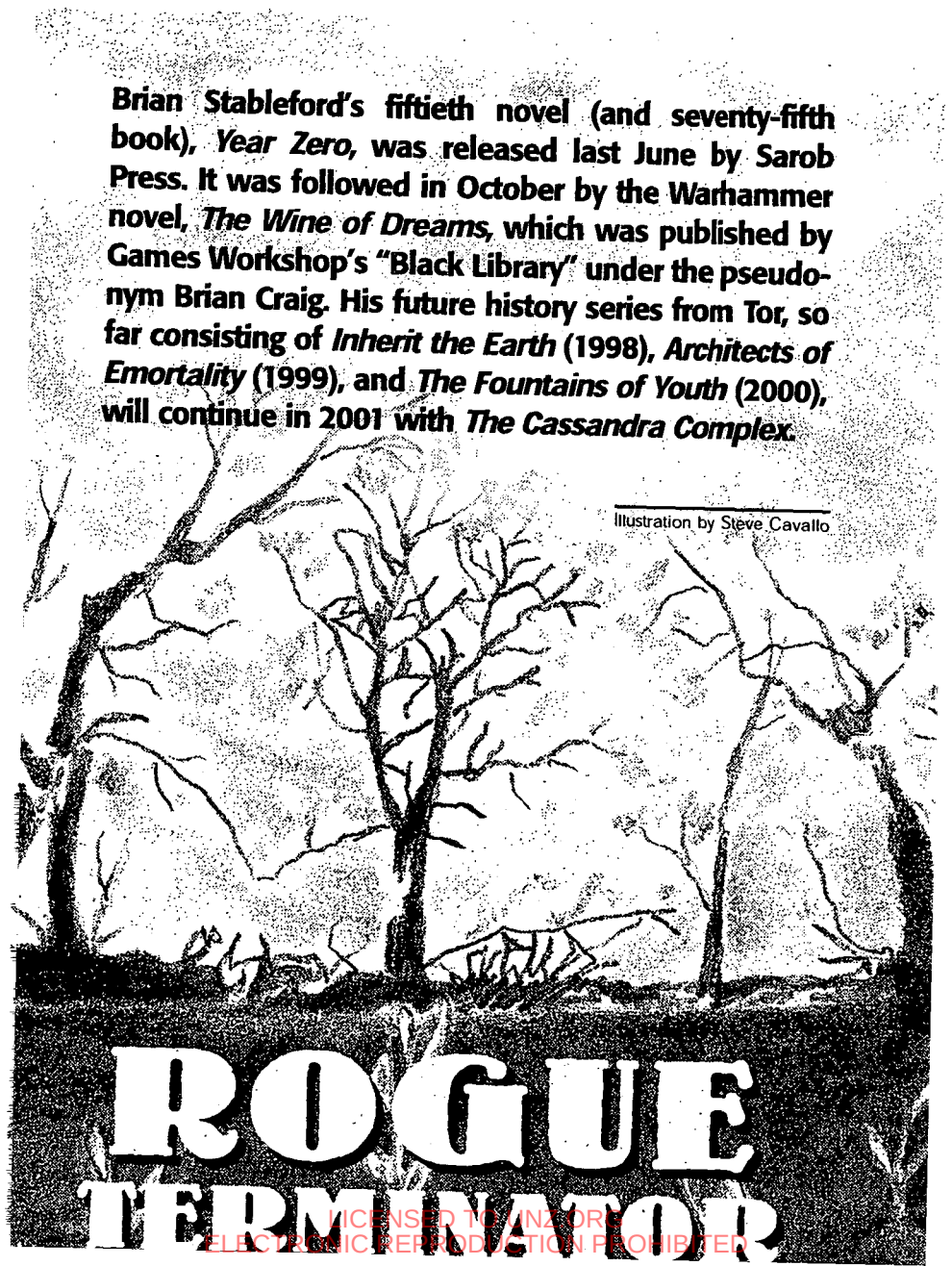

Illustration by Steve Cavallo

ROGUE TERMINATOR

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Dorset pharmers are old-fashioned folk—as you can readily see by the fact that we still spell the word "pharmer" rather than "pharma," the way the trendies in Berkshire do. Food-growers, of course, still spell the word with an f, but there haven't been many food-growers around Yetminster during the last twenty years. Even the apple-growers in Somerset have given up the cider business in the interests of packing their Coxes and Braeburns with plantigens. Up in Taunton they rub their hands in glee every time one of the tabloids tells us that the first plague war is bound to break out any day now.

It's because we're so attentive to tradition in these parts that we still do our serious drinking on a Sunday. Pharming is just as much a seven-day-a-week job as farming used to be, and no one hereabouts actually rested on the Sabbath even in the days when there were still a few wives and pensioners addicted to religious observance, but you have to make room for drinking somewhere in the calendar and the best pub in Yetminster happens to be just across the road from the biggest church. Pharmers, like farmers, aren't the kind of folk to do their drinking willy-nilly; it's the kind of vocation that requires its followers to get together on a regular basis to swap news and tips—especially tips. The science is still moving forward at breakneck pace, you see, and nobody but a fool ever waits until the AgMin field tests are complete before improving his stocks. It's not enough to be up with the Honest Joneses if you want to make real money—you have to be a step or two ahead. We like to think of it as Dorset's heroic contribution to the cutting edge of progress.

The bravest—and, as it turned out, strangest—of all our contributions to the cutting edge of progress began on a cold night in February 2034, when there were so few townies about that we didn't even have to wait for chucking-out time before getting down to the meat of the conversation. Naturally enough, it was Jack Gridley who had the tip. The Gridleys have always been fashion-leaders, ever since Jack's granddad, Old Freddy, came up with the wheeze of using a plank and a bit of string to make mysterious circles in our cornfields so our folks could charge tourists and scientists a pound a head to see them. Come to think of it, though, it was also Old Freddy who couldn't be content with circles, and got so carried away with more complicated designs that he became obsessed with the idea that he was being inspired and guided by beings from a higher dimension—which did rather undermine the whole point of the exercise.

"You doing rape this season, Lukey?" Jack asked me, in a quasi-confidential manner, as he stared contemplatively at the froth on his third pint of the night. That furtive way of speaking was the signal for everyone else to prick up their ears, and everyone did, although they continued to maintain the polite pretense that Jack and I were having a private discussion.

"Course I am," I told him. "The arse's dropped right out of wheat and corn's way past hackneyed. Oilseed's where it's at. Everyone knows that. Fifty-seven new varieties last year alone. I'm thinking of sowing the whole

JOE SANDERS LUIZ PRO
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"Pity he could never follow his own advice," I observed, refusing to allow myself to be nettled.

"Well, that's as it may be," Jack conceded, "but I'm a Gridley through and through, and I'm content to leave it to the big boys to muck about with so-called orphans. I'm going for the new generation of coryza inhibitors myself."

I'd had my fingers burned back in '31 dabbling in cold cures, and I wasn't prepared to bet that the new generation would be any more effective in the long term than the last three, but I could tell that Jack had something else on his mind apart from pick-and-mix pharm stocks, so I didn't argue.

"Mind you," he went on, when the pause had been pregnant long enough, "it's a real pain in the arse having to buy new seed every year. Gives us the scope to experiment, of course, and it certainly wouldn't do to keep on planting the same old stuff in a rapidly evolving market, but how long is it now that you've been producing those morphine precursors? And how much better are this year's beta-two agonists than last year's?"

"No way around it," I said, cautiously. The seed companies loved their terminators, and the AgMin was behind them all the way. Nobody wanted to go back to the old days, when there were townies coming out and trampling our business left, right and center just in case we gave a butterfly a stomach ache. The only way the civil serpents at the AgMin had been able to weasel the GeneMod legislation through the New Lords was to promise faithfully that the only crops grown on English pharms would be incapable of producing fertile seed, so that anything that went wrong would be a once and once only affair.

"Well," said Jack, "that's what people think—but I've always been a Gilbert and Sullivan fan, and I've always been exceeding fond of *The Mikado,* which makes the very wise point that as long as the public at large believes that the executioner has done his work, whether he actually has or not, the ends of justice are served."

I wasn't about to argue with Gilbert and Sullivan, even though I knew they'd been dead far too long to have any meaningful opinions on the Genetic Revolution, so I cut straight to the chase. "Are you saying that you can lay your hands on some engineered rape stocks that haven't been neutered?" I asked.

"Naw," he said, disgustedly. "Anyone can do that—but what do you get out of your crop except soap and cooking oil? What I'm saying is that I know where I can lay my hands on a terminator decoupler. A way to turn the reproductive potential of *any* GM seed back on."

"And where did *that* come from?" I asked, skeptically.

"From a pharm, of course," he told me. "A YAC pharm, as it happens. Hasn't yeast always been the agriculturist's best friend, ever since the day that the first beer was brewed?"

YAC production isn't what I'd call proper pharming. Yeast Artificial Chromosomes are just molecular machines used in genome sequencing, not real pharmaceuticals. I have to admit, though, that molecular artificers are clever buggers. If anyone was going to come up with a terminator terminator, I figured, it was highly likely to be some bored YAC pharmer stirring up his vats to see if anything interesting floated up with the scum.

"I'd still have to buy this year's seed," I pointed out, "And every time I wanted to try something new in future, I'd have to buy it in."

"You'd have to keep buying new stock anyway, to avoid suspicion," Jack

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pointed out. "We wouldn't want the Minispies to come poking their long noses in, would we? But think how much you could save if you could plant, say, half your fields with seed from the previous year's crops? You'd have your choice, after all. If the dystrophin repair business happens to go belly-up you can just chuck the seed away, but telomere extrapolants might last as long as you do—and if they work the way they're supposed to, that could be a *very* long time."

He had a point—and he'd finished his pint.

"Let me get you another," I said. "Maybe we can do a bit of business."

I wasn't the only one, of course. By the time Jack left the pub at four in the morning he'd sunk at least sixteen, and hadn't had to pay for a single one. His walk was as steady and forceful as ever, though, and I knew that his Land Rover wouldn't hit anything he hadn't aimed it at during the five-mile drive back to his place. It's wonderful what a man can accomplish with a little ingenuity, a good stock of home-grown rapes stuffed full of cytochrome-P450 assistants, and a contact in the YAC business.

The best thing about the terminator decoupler was that it was so close to being alive that it could reproduce itself almost as easily outside the infused seeds as inside. As long as I kept the culture well-fed with enriched glucose substrate, Jack assured me, I'd never run out. He wasn't spreading the stuff around with the intention of making a big profit, you see. He was doing it because we were mates, all in the same business and all in the same boat. That was why we were happy to let the little miracle-worker be known by one and all as Jack's YAC, although it wasn't, strictly speaking, a YAC and he hadn't actually invented it. Matiness has always been the strength of English farming folk—except, of course, for those located east of Salisbury, west of Chard and north of Wincanton. We stick together, and we guard one another's backs. We like to think of it as the spirit of the Cerne Abbas giant.

I decided to be careful, and not to expose the entirety of my newly bought seed-stocks to the terminator decoupler. I knew full well that the first law of genetic engineering is that you can never do *one thing*. Every alteration of the metabolic flux inside a cell has consequences, and the feedback mechanisms regulating that flux are so complicated that some of the consequences are always unforeseeable. So I carefully split each parcel of seeds into two, exposing one to Jack's YACs and leaving the other uninfected. I also divided the stocks between different fields wherever it was practicable, or different halves of the same field where it wasn't. Never let it be said that mere pharmers are too stupid to understand the underlying logic of the experimental method.

We had a very good spring, even by comparison with the early Greenhouse years before the UN Forestry Commission got its plant-a-billion-a-year program off the ground. My fields turned green, then vivid yellow, in a very satisfactory manner. There wasn't any obvious difference between the crops that had been treated with Jack's terminator terminator and the ones that hadn't—but I hadn't expected any, so that was all right. The morphine precursor producers seemed to be having a particularly good year, but the plants whose oils were engineered to be full of transposon suppressants were slow starters. I thought for a while that we might have a problem in the boggier ground with some kind of facultative pest that had made the jump, but once the flowers were out the plants came on well enough, much to my relief. The Biodiversity Lobby had become so strong that the Ministry

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wouldn't let us use any but the most specific biopesticides in case we took out a few innocent bystanders along with the rapemunchers, but every five years or so natural selection would throw up a new subspecies that was ready, willing, and able to take our pride and joy apart, and the AgMin troubleshooters never found a fix in time, no matter how quickly the bug was reported.

All in all, though, things were going very smoothly by midsummer's day, when family tradition dictated that I take a few hours off to drive Shelley and the kids up to the top of the downs for a good old-fashioned picnic. We always sat on the edge of one of the Ministry's woodland sanctuaries, where we could listen to the birds that still knew how to sing while looking out over the vast ocean of yellow that extended all the way to Sherborne in the north and all the way to Dorchester in the south.

The rapesea was dotted everywhere with islands, some of them green, some of them red-tiled, and not a few of them grey, but it had no obvious boundaries except the railway and the Frome. About half the green islands were wildlife minisanctuaries; the rest included a few relict oakwoods, a couple of dozen test crops—mostly strawberries, but some potatoes, and even a few beets—and a few fugitive fields of barley.

"It's all very impressive," Shelley admitted, when I called her attention to the stately calm of the lovely yellow expanse, "but I can never quite get over the fact that it's called *rape*. Remember all those old jokes about the rape of the English countryside?"

"It's *oilseed* rape," I reminded her, not for the first time. "If it makes you feel better, pretend it's mustard. And if you think this is impressive, imagine what it must be like in India." South-East Asia was so oil-poor that the second generation of oilseeds adapted for tropical and sub-tropical habitats had been taken up by native farmers almost as enthusiastically as the rubber trees and bananas that secreted vaccines against hepatitis-C, malaria, and every other pestilence endemic to the region had been taken up in Indonesia and Malaysia.

I tried to explain to the kids that the climatologists loved the Indian rapeseas even more extravagantly than the politicians because of the contribution they were making to rainfall distribution, but they weren't in a mood to be lectured. Shelley told me that they weren't old enough to grasp the significance of the fact that the age-old tyranny of the monsoon was finally giving way to an era of environmental fraternity, but she was just trying to let the brats off the hook. Liz probably wasn't old enough to take it all aboard, but Joe could have taken an intelligent interest if only he'd been that way inclined.

"It's all so *boring*," Joe complained, just to make certain that I knew that he'd far rather have stayed at home to play VR-games. "It's all the *same*."

"No it's not," I assured him. "There are more than thirteen thousand variants of oilseed rape in Dorset. Shall I explain why we can't simply grow all the different drugs in the same plant?"

"Anything but *that*, Dad," he complained. "Anyway, I know already—I'm not stupid, you know."

"It's not just because it's a good idea to keep your products separate, although it certainly is," I soldiered on, regardless. "The real problem is that if you carry out multiple transformations on a single set of chromosomes, the risk of buggering up the developmental process increases exponentially."

Shelley frowned, because she didn't like me saying "buggering" in front of

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the kids, but she didn't say anything. She left that to Joe, whose response was: "Boring, buggering *boring!*"

It was true that he wasn't stupid, even though he was easily bored. He was smart enough, in his own way, but I'd begun to worry that he'd never make a pharmer. That, I supposed, was down to Shelley's genes. I'd countered their influence as best I could, but there's only so much DNA a man can provide. It wasn't her fault, of course—she hadn't designed the mechanics of inheritance. I'd often wondered what kind of parent would foist a name like Shelley on a Yetminster girl, but her mum and dad had died the year before I met her, killed on the M3 north of Winchester by a lorry driver busy arguing on his mobile phone. That was one problem the pharmacogenomicists would never get to grips with—infinitely more intractable than souping up the liver to provide instant sobriety on demand. We'd agreed readily enough to call our own girl Elizabeth.

"The birds are pretty, aren't they, Mummy?" was Liz's contribution to the cause of family harmony.

"Yes, they are," Shelley assured her. "Every year we come there are more and more. One day, they'll learn to sing again the way they used to. They have the voices. They just have to learn to use them musically."

She was being sentimental, but it was okay by me. I missed the birdsong too, and lots of other things besides—but I was a pharmer through and through, and pharmers have to think of the future. The pharmacogenomicists may be the ones who are designing the future, but pharmers are the ones who actually have to *make* it. If ever the plague war does come, we'll be the poor buggers digging for victory.

I kept a careful eye on the YAC-infected plants as they continued to grow, of course, but the terminator decoupler didn't seem to have had any visible effect on the flowers—in fact, I began to wonder if it had had any effect at all. It occurred to me that I was going to look like a prize fool if I sowed half my fields the following year with seed that turned out not to be fertile at all. The insects buzzing and fluttering benignly around the flowers seemed happy enough, but I wasn't sure whether to take that as a good sign or not. The birds that came chasing the local insects seemed happy enough too, but that didn't seem relevant.

As Shelley had observed during our trip to the downs, the birds still seemed to be increasing their numbers year by year. It was difficult to believe that even chaffinches, tree sparrows, and lapwings had been brought to the brink of extinction as recently as '21—the year Joe had been born. All but a handful of familiar species had eventually come through the great depletion pretty well, but they'd had to change their habits considerably. By 2034, the larks, swallows, sparrows, and thrushes had been on the way back for a full decade, but the abandonment of their old territorial habits had caused many of them to fall silent, because their singing had always been so closely associated with the marking of those territories. Some people saw that as a disaster, or an accusing commentary on our management of history, but I wasn't so sure.

Like pharmers, I figured, the pioneers of new avian culture had been merely forced by the ecological revolution to abandon their outdated territorial assumptions and adapt to a more flexible way of life. In so doing, if you cared to look at it like that, they were providing a shining example of the awesome versatility of Nature. Maybe it was a pity that they'd given up

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on their traditional ditties—but I'd lived on the land all my life, and I'd always thought that their songs were crude and primitive. I'd actually written to the *Guardian* to say so in '25, when the letter column had been besieged by ridiculous proposals to set up educational tannoy systems throughout the south of England to "teach the world to sing again" by using digital technology to "restore the lost heritage of the skylarks and the thrushes."

Personally, I approved of the gutsy way in which the newly discreet birds had got used to flying considerable distances in mixed flocks to feed themselves, returning to their roosting-areas at nights. I liked the way they sometimes darkened the sky at dusk while they traded places with the bats. The bats had been having a particularly good time since the last anti-extinction crusade, and there was hardly a loft in Yetminster and Crewkerne in '34 that didn't have a purpose-built batroost as well as a soffit-set of nesting-boxes. My place was an exception, of course, but if any passing townie asked, I always said I'd had the chimneys on the house and the roof-space of the barn converted. Who was ever going to know the difference without climbing up to take a look?

I became worried all over again when the time came to bring the crop in and put it through quality control. I was tempted to try to keep the two halves of the various stocks separate so that I'd know if there was any difference in yield between the plants whose terminators had supposedly been deactivated and those that were exactly as the suppliers intended, but in the end I mixed them all up. Any difference that had showed up would have attracted further attention from the scrutineers, and the last thing I wanted was to excite the curiosity of my suppliers' agents or visiting Minispies. Overall, returns were pretty good, especially the morphine precursors and—less expectedly—the late-blooming transposon suppressants.

"What exactly *are* transposon suppressants?" I asked the company's tallyman as he calculated his rake-off.

"As I understand it, transposons are weird DNA sequences that can shift other bits of DNA around the chromosomes during meiosis," he said, offhandedly. "Opinions seem to vary as to whether they're relics of conscripted viruses or satellite spinoff. Anyway, their activity increases the generation-on-generation mutation-rate, especially in mammoth genes. Most of the affected eggs abort, but some don't. The posy gits in PR say it's one of the selective taxes we paid for our rapid evolution from the ancient primates. For the moment, transposon suppressants are officially classified as orphan drugs, targeted at a narrow range of infertility problems, but we're hoping to upgrade them. The lab boys are confident that our present field trials will demonstrate that long term usage can delay menopause, but the real problem is that they're such delicate compounds. We're more anxious about stability than utility. I don't mind telling you that it's quite a relief to see you bringing in the crop at this level of productivity. If only they'll store as well as they grow, they could be big money-spinners. It's possible that they can help reverse falling sperm counts. too—lots of demand for *that* nowadays."

Not round here, I muttered, under my breath. *We're all Cerne Abbas giants in these parts.* Aloud, I said: "Do they stop transposons shifting the plant DNA around too?" I wasn't just making conversation or showing off—I really *do* try to take an interest in these matters. It's a pharmer's clear duty.

"Plants don't have as much intergenic DNA as animals," the tallyman as-

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sured me, "so they probably don't go in much for transposons. It wouldn't matter if they did, though. All the suppressants would do is make sure they bred a little truer, if they bred at all—which they don't."

I dropped the topic then, lest the conversation should stray on to dangerous ground.

Come the spring of '35, all the Sunday-night regulars were getting a bit worried about Jack's YACs. We all needed reassurance that the seed we'd reserved would actually germinate. None of us had put all his eggs in the one basket, of course—there was the usual range of new variants to try, and we had to buy in some repeat stocks to stop our suppliers getting suspicious. Mercifully, there were so many biotech companies clamoring for our attention that they were all quite used to being in one year and out the next. I don't think any of us intended to plant more than a third of his acreage with the reserved seed, and the more cautious souls were thinking in the region of a fifth or a sixth—but even that represented a considerable gamble, given the other uncertainties to which our profit margins were prey.

"You have to speculate to accumulate, lads," Jack told us. "Anyway, it's our duty as men of Wessex to be the standard-bearers of the revolution. Didn't our ancestors fight tooth and nail to take this land from the Celts? Are we men or mice?"

Now that the patient sequencers have assured us that mice have homologues of 98 percent of human genes, and protogenes comparable to half of the remainder, the distinction between mice and men doesn't seem quite as clear as it must have done in the good old days when the West Saxons were kicking the shit out of King Arthur and his Romanesque nancy-boys, but it would have been ungenerous to point it out. Anyway, we could all remember the money we'd made before the arse dropped out of the corn circle scam, so we were still inclined to put our trust in Gridley ingenuity and Jack's YACs.

We were duly rewarded for our faith when the reserved seed sprouted with astonishing vigor, easily outgreening the fields in which we'd planted seeds whose terminators were supposedly still operative.

Some people say that pharmers, like farmers, are never satisfied, and I suppose there's a certain truth in that. There's always *something* to worry about on a pharm. There are so many things that *could* go wrong that every time things go right you can't help feeling that fate is busy storing up trouble. I have to admit that I got more and more worried as the growing-season progressed, simply because its progress was so prodigious.

The new plants did pretty well, but the plants grown from the illicitly reserved seed did *incredibly* well. They grew fast and they grew tall. Their color was bright even when they were still green, but when they put out flowers, the yellow was dazzling. The yellow of engineered rape has always been a little more fervent than the slightly primrosy tint of the natural varieties, and the flowers always feel slicker to the touch, but all the rapes whose terminators had been decoupled caught the sunlight like amber warning-lights, and when I pinched them in my fingers they were positively *buttery*. Even engineered rape doesn't have a lot of odor, and I'd never thought of it as particularly sweet-smelling, but Jack's YACs had wrought miracles with the scent of the refertilized stocks. They were so nearly intoxicating that I couldn't help wondering whether I could do a deal with the guys from Country Wines who were doing a roaring trade with engineered elderflower.

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None of this was just my opinion, either. There was no particular surprise in the fact that Shelley and Liz approved of the unprecedented lushness, but even Joe felt compelled to comment on it.

"Shit, Dad," he said, feeling free to swear because Shelley wasn't around. "What kind of fertilizer have you been *using?* It's bad enough going through adolescent hormone hell without getting a blast of raw pheromones every time I open my window!"

"Human pheromones are a silly myth," I told him, sternly. "They're the physiological equivalent of feng shui."

"I didn't mean it *literally,*" he assured me. "Mind you, if the wind's blowing toward Cerne Abbas, Old Chalky's likely to get right up and go a'huntin'—and not for rabbits, if you get my drift. *Now* I understand why they call it rape."

"Don't let your mother hear you talking dirty like that," I said. It didn't seem to be the right time to inform him that the mighty tool of the Cerne Abbas giant was a nineteenth-century fake—probably the work of Old Freddy Gridley's grandfather—although he was certainly old enough to know the truth.

I couldn't help remembering Joe's verdict, though, while I watched the birds and the bees at play. It certainly seemed to me that the friendly insects *loved* the nectar of the superabundant flowers, and that the ever-discreet birds loved the taste of insects reared on that produce. I had never seen so many swallows and swifts over my fields, even in my father's day, and the thrushes were beginning to flock like the starlings of old. They were chirping a fair bit too, albeit a bit uncertainly—as if they were trying to remember, but hadn't quite got the knack of it. Even the jays and peregrines seemed to be having a bonanza year. It was obvious that if these increases in productivity were reflected in the oil extracted from the plants, the tally-men were going to be just as happy as the birds—and as suspicious as all hell.

"What are you worried about?" Jack retorted, scornfully, when I voiced anxieties on the second Sunday in June. "You know the drill. Deny everything. Must be something in the soil, Mr. Ministryman. Us poor yokels don't understand these newfangled biochemical thingumajigs."

"Suppose the YACs show up on the assay?"

"Suppose they do. Same drill. What's a YAC, Mr. Ministryman? Tibetan cows, ain't they? Are you telling us that those bloody salesmen have been peddling *contaminated stock?*"

"It might not be that easy, Jack," I persisted. "What we have here is an unexpected side-effect. Your bloody YACs haven't stopped at decoupling the terminators. Who knows what else they've stirred up? Suppose they've interfered with the products—what then? It's no good growing giant plants if the morphine precursors won't precurse and the beta two agonists won't agonize."

He didn't bother laughing at the feeble jokes. "Suppose they haven't, Lukey," he said. "Suppose they've done nothing but boost our yields skyhigh. We Gridleys have always had a nosé for these things, and I reckon we're on to a real winner here. I reckon this could make us rich, boy. Keep your nerve and stick with it, that's my advice."

It was safe enough, as advice went. After all, what choice did we have? We were in for the penny and in for the pound—and as Jack said, if it did blow up in our faces, all we had to do was deny everything. If all else failed, we could always try to blame it on little green men. It had worked before.

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"Well," Sid Phillips put in, cheerily, "at least we got the dawn chorus back, don't we? Just like old times. Well, not quite, but even better in a way."

That was true too, I realized, especially the "not quite, but even better in a way." I hadn't really noticed it until my attention was called to it, because the dawn chorus had always sounded raucous to me, and the fact that it was gathering volume day by day had seemed to me like a progressive return to the old days—but it wasn't, quite. It was a more remarkable thing than that. Unprompted by any tannoy systems, the few birds that had begun to sing again had been experimentalists, and now the results of their experiments were beginning to spread. The dawn's heralds were singing new songs, more exotic—and perhaps more accomplished—than the old.

It wasn't until midsummer day that I realized the true extent of the developing problem—if "problem" is the right word. I was too close to it on the pharm, always inside looking out, seeing the details one by one but not weaving them together into any kind of coherent whole. It wasn't until our annual picnic that I got a chance to see the big picture, in all its awful glory.

There was nothing awful and everything glorious about the day itself. Even Joe seemed glad to be dragged out of virtual reality. It was Joe, in fact, who first observed that the scene which confronted us as we sat together on the same old hilltop was considerably different from the one we were used to.

"Your precious sea of yellow looks a lot stormier this year, Dad," he observed, with the kind of sneer that only a teenager can contrive.

From that distance, it was easy enough to see that he was right. The illusory ocean formed by the fusion of millions of rape-flowers was much less flat than usual. The plants were growing to such different heights that some invisible and intangible wind seemed to be whipping up big waves, as if in anticipation of a typhoon. Given that the sky was so clear and blue, such choppiness seemed decidedly inappropriate.

"I rather like it," Shelley said. "It's bright, and there's more color in it—isn't there, Luke?"

There certainly was. To Shelley, of course, color was just color, but my pharmer's eyes were already straining hard as I tried to figure out *why* there was more color in what should have been a seamless place of pure and unadulterated yellow. It wasn't just the unprecedented brightness that had caught her eye; there were pinks and purples too. A man in my profession always has to be on the lookout for the return of the dreaded *weeds,* but I soon realized that the new colors weren't new plants; they were differences in the shading of the rape.

It was Liz, inevitably, who mentioned that the woods were noisier than usual. She had no old memories to awaken, no reflexes of exclusion. There was more birdsong in the carefully planted wood now than there had ever been during any picnic she'd been on. It was on its way back to what most people would have considered its natural level—but not to its natural state.

"Oh bugger," I muttered.

"What's wrong?" Shelley demanded, crossly.

"Nothing," I said. "Everything's fine and dandy. *Exceedingly* fine and dandy. It's summertime, and the rape is high. Higher than it's ever been before, and still getting higher. The birds are singing the way they never sang before, the bees are humming fit to bust, and the whole of bloody Dorset's got rosy cheeks. Everything's absolutely peachy. Too lively by half. It's supposed to be tame, but it's not. Jack's bloody YACs have slipped the leash, and they're making the rape run wild."

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"What *are* you on about, Dad?" Joe wanted to know.

"Cross-pollination," I said. "Cross-bloody-pollination and hybrid bloody vigor. Switch off the terminators, and the flowers stay fertile—but they don't fertilize themselves and their pollinators don't have enough discrimination to stick to their own kind. It shouldn't have mattered much, because the crossbreeds ought to have been selected out—combining different transformations is supposed to bugger up the developmental process, as every bloody schoolkid knows. Except that it hasn't. I can see that just by looking. The rogue terminator's running amok."

I realized, belatedly, that I hadn't ever asked Jack the most important question of all. He wouldn't have had an answer, of course, but I really ought to have asked, and I should have insisted that I wasn't going to use his bloody YACs unless and until his genomic wizards spelled out exactly *how* Jack's bloody YACs were going to decouple the terminators in our seeds. Without knowing that, I and all the others had simply had to take it on trust that it wouldn't decouple anything else—and now we were paying the price.

"It's those unstable tranposon suppressants," I muttered. "The little buggers have shafted those too. And the process isn't neutral. The decoupled products are *active*. The whole bloody mechanism has gone into reverse."

"Boring," Joe said. "Bloody buggering boring."

"This is supposed to be a picnic, Luke," Shelley said, through gritted teeth. "Can't you forget the ins and outs of pharming for five minutes?"

"Oh, it's a picnic all right," I told her. "It's a right bloody picnic and no mistake!"

By mid-August, the transformation of south-west England had made the TV news. By the end of August, it *was* the news, and not just because it was the so-called silly season. The Ministry men were out in force by then, sampling everything in sight and marveling at the results.

The birds were singing new songs. The bees were making new honey. The wildlife sanctuaries were overflowing, not merely with sturdy and virile individuals but with countless new varieties. The butterflies with psychedelic patterns on their wings were the most obvious, but I knew that the most significant changes would be inside, deep down in the metabolic flux of every cell.

The first rule of genetic engineering is that no matter how hard you try, you can never do just *one* thing. The second rule is that if you try to do too many things, chaos takes over. There isn't a third rule, because everything else is outside *the rules,* but humankind didn't evolve from the ancient primates—let alone from amoebas—by doing one thing at a time or giving up on chaos. Sometimes, when you mix things up, you don't just get a mess, you get *cooking*. What else is civilization about?

To the TV reporters and the curious townies, all the new colors were just colors, but we pharmers are physician enough to know that heightened color is a symptom of fever, and I knew soon enough that Jack's YACs had kickstarted a real fever of creativity in the fields of north Dorset. If thrushes were composing concertos and bees were packing their honey full of pheromones, and even the butterflies were playing Picasso, what would be going on inside the rape? What sorts of oil would we strike when we brought in the crop? Were we going to get paid for it, and if so, how much?

I suppose I was lucky not to get caught when the white-coated detectives descended on the fields like hail. The way I'd planted everything half and half, in neatly paired samples, would have been a dead giveaway if Jack's

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YACs had stayed where they were supposed to stay. Fortunately or unfortunately, they hadn't. They'd spread a lot more widely than anyone had anticipated. The fact that they could survive and thrive outside their hosts had enabled them to migrate out of the previous season's rape-roots into the soil, where they'd infected hundreds of other organisms, including nematodes, annelid worms, and beetle larvae. It hadn't made much difference while that first season lasted, any more than it had made much difference to the infected rapes, but that had only been the beginning.

None of the YACs' new hosts were in any way inconvenienced by their new commensals, so they had served as a reservoir from which the YACs remigrated to infect all the seeds I sowed in the spring of '35. That year's crop was, therefore, divided between second-generation terminator-decoupled individuals and first-generation terminator-decoupled individuals. By the time the Minispies started poking around, the natural conclusion for them to draw was that the whole farm and the whole bloody district had been hit by an unprecedented epidemic, whose symptoms were so various that the decoupling of the terminators didn't leap out at them as a uniquely significant or suspicious circumstance.

The second-generation plants I'd sown included the full range of variants I'd planted in '34, but I'd eliminated cytochrome-P450 assistants and the dystrophin repair agents from the new stocks, doubled my order of transposon suppressants and added a brand new line of novel anti-depressants. It turned out that all the products were more-or-less okay except the transposon suppressants, which had done a backflip and turned into transposon enhancers. That made them completely useless for medical purposes, because in the context of higher animal genomes, they had become dangerously mutagenic—but as the tally-man had pointed out to me the previous autumn, plants don't go in much for Fancy Dan stuff like mammoth genes, protogenes, and humungous satellite-repeat sequences. Nor do insects. Their DNA is exon-rich, and what the energized transposons were doing, not merely to their host plants but to the insects that fed on their nectar, and to anything that fed on the insects, was multiplying the number of functional genes. Polyploidy in plants and invertebrate animals often leads to gigantism, and the partial polyploidy promoted by the rogue transposons was encouraging all the local wildlife in that direction, as well as promoting other local superabundances.

If all else had been equal, the work of the rogue transposons would have been strictly short-term, because the augmented chromosomes of the affected plants wouldn't have been able to pair up in the next round of cross-fertilization. In effect, the accidentally created transposon-enhancers would have functioned as a natural one-step-removed terminator technology—but Jack's YACs had taken care of that by drastically reducing the fussiness of the chromosomes during meiosis.

All of which, as Joe might say, is boring, buggering boring—except in sum. What it added up to in the summer of '35, though, was a spectacular boost to the local pace of evolution whose like had not been seen since the last supervolcano went off seventy-four thousand years before and scoured all the continents clean, ushering in a new phase of fabulous adaptive radiation.

Fortunately, the main consequence of the fact that the new ecoboom was limited, at least in the beginning, to a triple handful of farms in north Dorset, Somerset, and Devon was a dramatic increase in tourism. Townies love singing birds and pretty butterflies, and above all else they love novel-

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ty. Even if the crops hadn't come in as well as they did, we'd all have grown richer. As it was, we grew *much* richer.

If the Minispies had known what to look for, they might just have been able to figure out that all three of the affected communities had a key member who knew somebody who knew somebody who worked on a YAC pharm, but they didn't. By the time they got involved, the ecosituation had become very complicated indeed, and it would have taken Sherlock Holmes and a Cray supercomputer to work out how it had all started—but just in case, Jack Gridley and I started taking surreptitious trips to Hampshire and Berkshire armed with buckets full of YAC soup, surreptitiously depositing the stuff here, there and everywhere, for all the world as if it had fallen from Heaven. Maybe there is a third rule of genetic engineering, identical to the eleventh commandment: *whatever else you do, cover your arse*.

We were as discreet as we were generous, though, in more ways than one. As soon as the townies started flocking westward in droves, inspired by the reports in the *Sun* and the *Mirror,* we had to make bloody sure that our farms were the ones that every tour-guide considered unmissable. They had to be the best of the bunch, so that we could bill them as the English Edens and the twin focal points of the New Genesis. We worked as hard toward that goal as any pharmer ever had, since the day when it all began.

The way it all turned out was very gratifying, even if the Ministry did put an end to it when they bred a bug to chase down all Jack's YACs and made sure that normal service was resumed, evolutionwise. It was great while it lasted, and I did my utmost to make the most of it. I think I succeeded.

I was pleased for myself, of course, but what really made me proud that August was the way Joe took to it all like a duck to water. The little bugger had always liked showing off, and suddenly he was in his element. There was no more skulking in his bedroom once the gawkers began to arrive in their hundreds, including teenage girls by the dozen. He was out in the fields like a true pharmer's son, giving them a proper education in the intricacies of genomics, the mysteries of the transposon, and the perennially wayward ways of Nature.

He never meant a single bloody word of it, but it was birdsong to my ears.

Jack Gridley, alas, went the other way. His son was never a talker—the bullshit always seemed to skip a generation in his family—so Jack became the carnival barker himself. If he'd been as canny a scriptwriter as my Joe turned out to be, he'd have pleased a more various crowd, but he went all mystical and started talking about the supernatural gifts of providence and the mysterious ways of the divine intelligence.

It wouldn't have been so bad if it had all been insincere, but Jack started going on in exactly the same way after hours on Sundays, lecturing us all on the subject of how he'd obviously been chosen by God Himself to bring the miracle of spiritual renewal to the primal wilderness of Wessex. Some people just don't know when to stop.

Sid Phillips nudged me one night when Jack was holding forth and said that it was the spiritual renewal of the Cerne Abbas Giant all over again, but Jack had always been my best friend and it didn't seem right to laugh at him, even if he was going off half-cocked. If we're going to survive and make progress, we pharmers have to stick together, and mind one another's business as carefully as we can.

After all, if we don't, who will? ○

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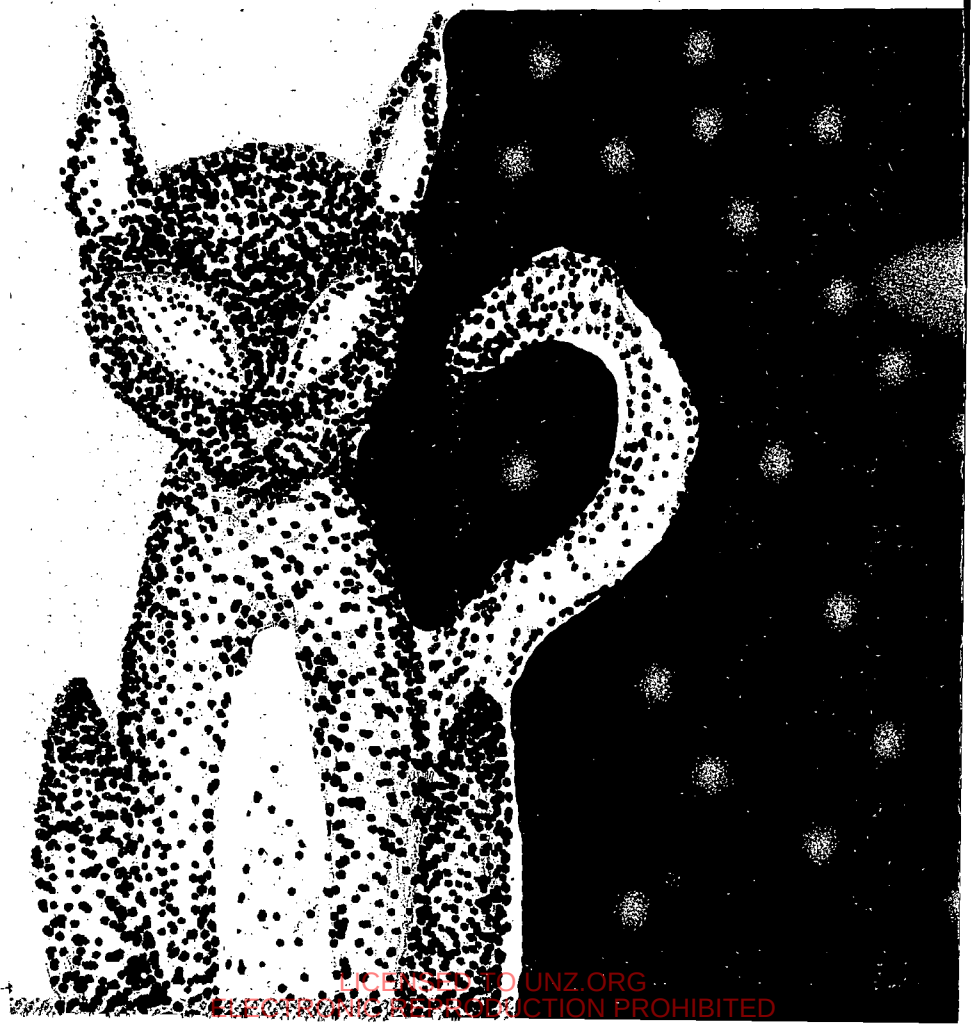
MORE WAYS TO TELL IF YOUR CAT IS A SPACE ALIEN

1. Your cat came from a pet store in Roswell, New Mexico.
2. You find long distance charges on your telephone bill to area codes the operator has never heard of.
3. You come home to find your cat walking on the ceiling, and your cat just looks at you and says, "Yeah, so?"
4. Your cat goes hunting and brings you home a Little Green Mouse.
5. Your cat's eyes glow in the dark. Even when they're closed.
6. When you scratch your cat behind the ears, you notice she has antennae.



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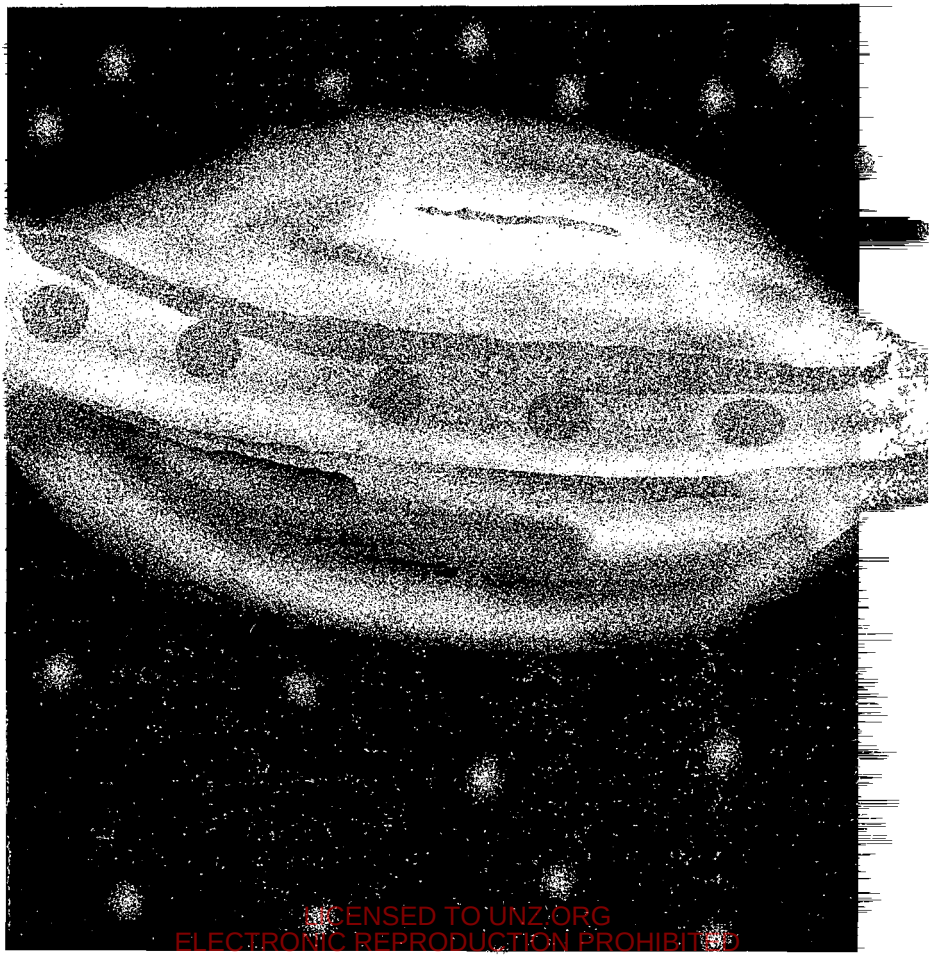
7. Your cat volunteers to remove your brain.
8. You *agree* to have your cat remove your brain.
9. Your cat can program your computer better than you can.
10. Your cat can program your computer better than your ten-year-old kid can.
11. You discover that your cat has a glitzier Web page than you do.
12. You discover your cat has put you up for adoption on the Internet.
13. UPS arrives at your front door with a cage to take you to your new owner—on 51 Pegasi Prime.

—Mary A. Turzillo



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COMPUTER VIRUS

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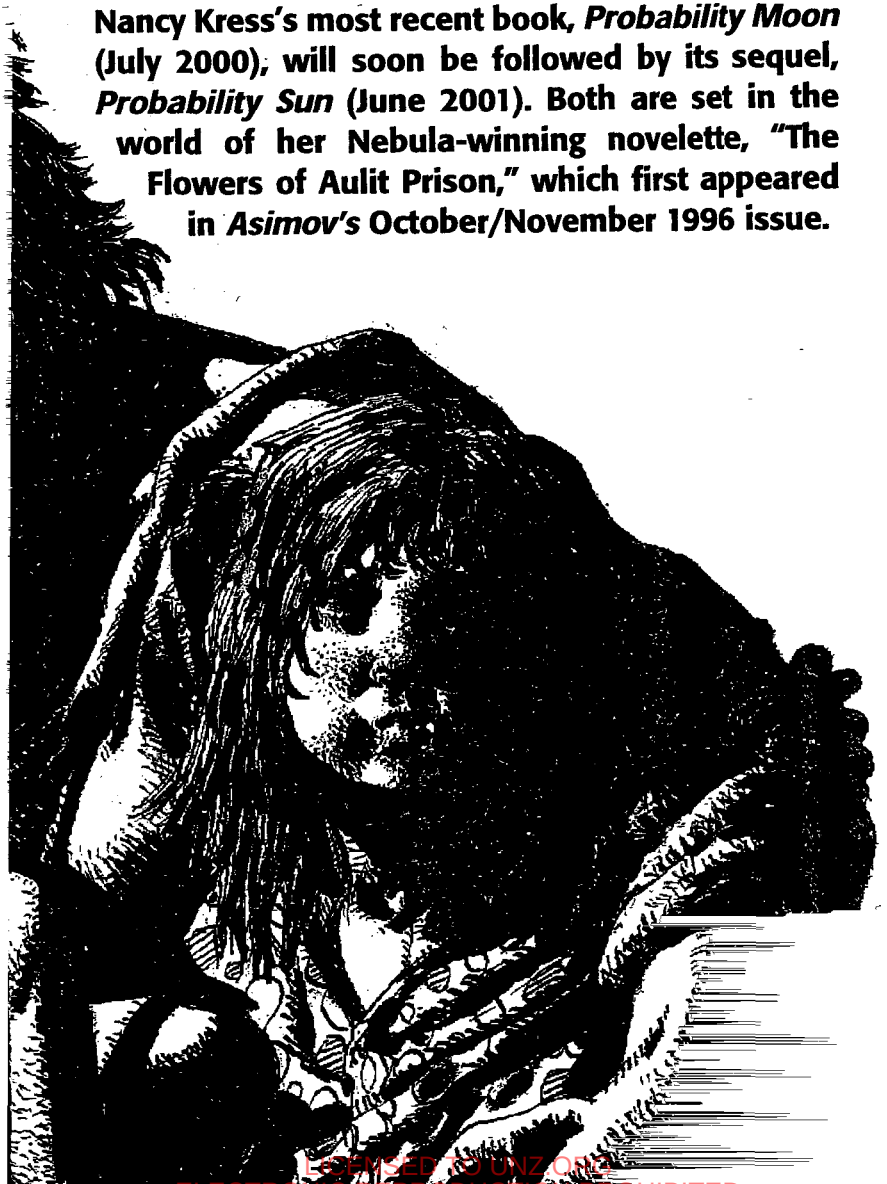
Nancy Kress

Illustration by Janet Aulisio

Nancy Kress's most recent book, *Probability Moon* (July 2000), will soon be followed by its sequel, *Probability Sun* (June 2001). Both are set in the world of her Nebula-winning novelette, "The Flowers of Aulit Prison," which first appeared in *Asimov's* October/November 1996 issue.



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"It's out!" someone said, a tech probably, although later McTaggart could never remember who spoke first. "It's out!"

"It can't be!" someone else cried, and then the whole room was roiling, running, frantic with activity that never left the workstations. Running in place.

"It's not supposed to be this way," Elya blurted. Instantly she regretted it. The hard, flat eyes of her sister-in-law Cassie met hers, and Elya flinched away from that look.

"And how is it supposed to be, Elya?" Cassie said. "Tell me."

"I'm sorry. I only meant that . . . that no matter how much you loved Vlad, mourning gets . . . lighter. Not lighter, but less . . . withdrawn. Cass, you can't just wall up yourself and the kids in this place! For one thing, it's not good for them. You'll make them terrified to face real life."

"I hope so," Cassie said, "for their sake. Now let me show you the rest of the castle."

Cassie was being ironic, Elya thought miserably, but "castle" was still the right word. Fortress, keep, bastion . . . Elya hated it. Vlad would have hated it. And now she'd provoked Cassie to exaggerate every protective, self-sufficient, isolating feature of the multi-million dollar pile that had cost Cass every penny she had, including the future income from the lucrative patents that had gotten Vlad murdered.

"This is the kitchen," Cassie said. "House, do we have any milk?"

"Yes," said the impersonal voice of the house system. At least Cassie hadn't named it, or given it one of those annoying visual avatars. The room-screen remained blank. "There is one carton of soymilk and one of cow milk on the third shelf."

"It reads the active tags on the cartons," Cassie said. "House, how many of Donnie's allergy pills are left in the master-bath medicine cabinet?"

"Sixty pills remain," House said, "and three more refills on the prescription."

"Donnie's allergic to ragweed, and it's mid-August," Cassie said.

"Well, he isn't going to smell any ragweed inside this mausoleum," Elya retorted, and immediately winced at her choice of words. But Cassie didn't react. She walked on through the house, unstoppable, narrating in that hard, flat voice she had developed since Vlad's death.

"All the appliances communicate with House through narrow-band wireless radio frequencies. House reaches the Internet the same way. All electricity comes from a generator in the basement, with massive geothermal feeds and storage capacitors. In fact, there are two generators, one for back-up. I'm not willing to use battery back-up, for the obvious reason."

It wasn't obvious to Elya. She must have looked bewildered because Cassie added, "Batteries can only back-up for a limited time. Redundant generators are more reliable."

"Oh."

"The only actual cables coming into the house are the VNM fiber-optic cables I need for computing power. If they cut those, we'll still be fully functional."

If *who* cuts those? Elya thought, but she already knew the answer. Except that it didn't make sense. Vlad had been killed by econuts because his work was—had been—so controversial. Cassie and the kids weren't likely to be a target now that Vlad was dead. Elya didn't say this. She trailed behind

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Cassie through the living room, bedrooms, hallways. Every one had a room-screen for House, even the hallways, and multiple sensors in the ceilings to detect and identify intruders. Elya had had to pocket an emitter at the front door, presumably so House wouldn't . . . do what? What did it do if there was an intruder? She was afraid to ask.

"Come downstairs," Cassie said, leading the way through an e-locked door (of course) down a long flight of steps. "The computer uses three-dimensional laser microprocessors with optical transistors. It can manage twenty million billion calculations per second."

Startled, Elya said, "What on earth do you need that sort of power for?"

"I'll show you." They approached another door, reinforced steel from the look of it. "Open," Cassie said, and it swung inward. Elya stared at a windowless, fully equipped genetics lab.

"Oh, no, Cassie . . . you're not going to work here, too!"

"Yes, I am. I resigned from MedGene last week. I'm a consultant now."

Elya gazed helplessly at the lab, which seemed to be a mixture of shining new equipment plus Vlad's old stuff from his auxiliary home lab. Vlad's refrigerator and storage cabinet, his centrifuge, were all these things really used in common between Vlad's work in ecoremediation and Cassie's in medical genetics? Must be. The old refrigerator had a new dent in its side, probably the result of a badly programmed 'bot belonging to the moving company. Elya recognized a new gene synthesizer, gleaming expensively, along with other machines that she, not a scientist, couldn't identify. Through a half-open door, she saw a small bathroom. It all must have cost enormously. Cassie had better work hard as a consultant.

And now she could do so without ever leaving this self-imposed prison. Design her medical micros, send the data encrypted over the Net to the client. If it weren't for Jane and Donnie . . . Elya grasped at this. There *were* Janey and Donnie, and Janey would need to be picked up at school very shortly now. At least the kids would get Cassie out of this place periodically.

Cassie was still defining her imprisonment, in that brittle voice. "There's a Faraday cage around the entire house, of course, embedded in the walls. No EMP can take us out. The walls are reinforced foamcast concrete, the windows virtually unbreakable polymers. We have enough food stored for a year. The water supply is from a well under the house, part of the geothermal system. It's cool, sweet water. Want a glass?"

"No," Elya said. "Cassie . . . you act as if you expect full-scale warfare. Vlad was killed by an individual nutcase."

"And there are a *lot* of nutcases out there," Cassie said crisply. "I lost Vlad. I'm *not* going to lose Janey and Donnie . . . hey! There you are, pumpkin!"

"I came downstairs!" Donnie said importantly, and flung himself into his mother's arms. "Annie said!"

Cassie smiled over her son's head at his young nanny, Anne Millius. The smile changed her whole face, Elya thought, dissolved her brittle shell, made her once more the Cassie that Vlad had loved. A whole year. Cassie completely unreconciled, wanting only what was gone forever. It wasn't supposed to be like this. Or was it that she, Elya, wasn't capable of the kind of love Cassie had for Vlad? Elya had been married twice, and divorced twice, and had gotten over both men. Was that better or worse than Cassie's stubborn, unchippable grief?

She sighed, and Cassie said to Donnie, "Here's Aunt Elya. Give her a big kiss!"

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The three-year-old detached himself from his mother and rushed to Elya. God, he looked like Vlad. Curly light brown hair, huge dark eyes. Snot ran from his nose and smeared on Elya's cheek.

"Sorry," Cassie said, grinning.

"Allergies?"

"Yes. Although . . . does he feel warm to you?"

"I can't tell," said Elya, who had no children. She released Donnie. Maybe he did feel a bit hot in her arms, and his face was flushed a bit. But his full-lipped smile—Vlad again—and shining eyes didn't look sick.

"God, look at the time, I've got to go get Janey," Cassie said. "Want to come along, Elya?"

"Sure." She was glad to leave the lab, leave the basement, leave the "castle." Beyond the confines of the Faraday-embedded concrete walls, she took deep breaths of fresh air. Although of course the air inside had been just as fresh. In fact, the air inside was recycled in the most sanitary, technologically advanced way to avoid bringing in pathogens or gases deliberately released from outside. It was much safer than any fresh air outside. Cassie had told her so.

No one understood, not even Elya.

Her sister-in-law thought Cassie didn't hear herself, didn't see herself in the mirror every morning, didn't know what she'd become. Elya was wrong. Cassie heard the brittleness in her voice, saw the stoniness in her face for everyone but the kids and sometimes, God help her, even for them. Felt herself recoiling from everyone because they weren't Vlad, because Vlad was dead and they were not. What Elya didn't understand was that Cassie couldn't help it.

Elya didn't know about the dimness that had come over the world, the sense of everything being enveloped in a gray fog: people and trees and furniture and lab beakers. Elya didn't know, hadn't experienced, the frightening anger that still seized Cassie with undiminished force, even a year later, so that she thought if she didn't smash something, kill something as Vlad had been killed, she'd go insane. Insaner. Worse, Elya didn't know about the longing for Vlad that would rise, unbidden and unexpected, throughout Cassie's entire body, leaving her unable to catch her breath.

If Vlad had died of a disease, Cassie sometimes thought, even a disease for which she couldn't put together a genetic solution, it would have been much easier on her. Or if he'd died in an accident, the kind of freak chance that could befall anybody. What made it so hard was the murder. That somebody had deliberately decided to snuff out this valuable life, this precious living soul, not for anything evil Vlad did but for the *good* he accomplished.

Dr. Vladimir Seritov, chief scientist for Barr Biosolutions. One of the country's leading bioremediationists and prominent advocate for cutting-edge technology of all sorts. Designer of Plasticide (he'd laughed uproariously at the marketers' name), a bacteria genetically engineered to eat certain long-chain hydrocarbons used in some of the petroleum plastics straining the nation's over-burdened landfills. The microbe was safe: severely limited chemical reactions, non-toxic breakdown products, set number of replications before the terminator gene kicked in, the whole nine yards. And one Sam Verdon, neo-Luddite and self-appointed guardian of an already burdened environment, had shot Vlad anyway.

On the anniversary of the murder, neo-Luddites had held a rally outside

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the walls of Verdon's prison. Barr Biosolutions had gone on marketing Vlad's creation, to great environmental and financial success. And Cassie Seritov had moved into the safest place she could find for Vlad's children, from which she someday planned to murder Sam Verdon, scum of the earth. But not yet. She couldn't get at him yet. He had at least eighteen more years of time to do, assuming "good behavior."

Nineteen years total. In exchange for Vladimir Seritov's life. And Elya wondered why Cassie was still so angry?

She wandered from room to room, the lights coming on and going off behind her. This was one of the bad nights. Annie had gone home, Jane and Donnie were asleep, and the memories would not stay away. Vlad laughing on their boat (sold now to help pay for the castle). Vlad bending over her the night Jane was born. Vlad standing beside the president of Barr at the press conference announcing the new clean-up microbe, press and scientists assembled, by some idiot publicist's decree, at an actual landfill. The shot cutting the air. It had been August then, too, Donnie had had ragweed allergies, and Vlad looking first surprised and then in terrible pain. . . .

Sometimes work helped. Cassie went downstairs to the lab. Her current project was investigating the folding variations of a digestive enzyme that a drug company was interested in. The work was methodical, meticulous, not very challenging. Cassie had never deluded herself that she was the same caliber scientist Vlad had been.

While the automated analyzer was taking X-rays of crystallized proteins, Cassie said, "House, put on the TV. Anything. Any channel." Any distraction.

The roomscreen brightened to a three-D image of two gorgeous women shouting at each other in what was supposed to be a New York penthouse. ". . . never trust you again without—" one of them yelled, and then the image abruptly switched to a news avatar, an inhumanly chiseled digital face with pale blue hair and the glowing green eyes of a cat in the dark. "We interrupt this movie to bring you a breaking news report from Sandia National Laboratory in New Mexico. Dr. Stephen Milbrett, Director of Sandia, has just announced—" The lights went out.

"Hey!" Cassie cried. "What—" The lights went back on.

She stood up quickly, uncertain for a moment, then started toward the stairs leading upstairs to the children's bedrooms. "Open," she said to the lab door, but the door remained shut. Her hand on the knob couldn't turn it. To her left the roomscreen brightened without producing an image and House said, "Dr. Seritov?"

"What's going on here? House, open the door!"

"This is no longer House speaking. I have taken complete possession of your household system plus your additional computing power. Please listen to my instructions carefully."

Cassie stood still. She knew what was happening; the real estate agent had told her it had happened a few times before, when the castle had belonged to a billionaire so eccentrically reclusive that he stood as an open invitation to teenage hackers. A data stream could easily be beamed in on House's frequency when the Faraday shield was turned off, and she'd had the shield down to receive TV transmission. But the incoming datastream should have only activated the TV, introducing additional images, not overridden House's programming. The door should not have remained locked.

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"House, activate Faraday shield." An automatic priority-one command, keyed to her voice. Whatever hackers were doing, this would negate it.

"Faraday shield is already activated. But this is no longer House, Dr. Seritov. Please listen to my instructions. I have taken possession of your household system. You will be—"

"Who are you?" Cassie cried.

"I am Project T4S. You will be kept in this room as a hostage against the attack I expect soon. The—"

"My children are upstairs!"

"Your children, Jane Rose Seritov, six years of age, and Donald Sergei Seritov, three years of age, are asleep in their rooms. Visual next."

The screen resolved into a split view from the bedrooms' sensors. Janey lay heavily asleep. Donnie breathed wheezily, his bedclothes twisted with his tossing, his small face flushed.

"I want to go to them!"

"That is impossible. I'm sorry. You must be kept in this room as a hostage against the attack I expect soon. All communications to the outside have been severed, with the one exception of the outside speaker on the patio, normally used for music. I will use—"

"Please. Let me go to my children!"

"I cannot. I'm sorry. But if you were to leave this room, you could hit the manual override on the front door. It is the only door so equipped. I could not stop you from leaving, and I need you as hostages. I will use—"

"Hostages! Who the hell are you? Why are you doing this?"

House was silent a moment. Then it said, "The causal is self-defense. They're trying to kill me."

The room at Sandia had finally quieted. Everyone was out of ideas. McTaggart voiced the obvious. "It's disappeared. Nowhere on the Net, nowhere the Net can contact."

"Not possible," someone said.

"But actual."

Another silence. The scientists and techs looked at each other. They had been trying to locate the AI for over two hours, using every classified and unclassified search engine possible. It had first eluded them, staying one step ahead of the termination programs, fleeing around the globe on the Net, into and out of anything both big enough to hold it and lightly firewalled enough to penetrate quickly. Now, somehow, it had completely vanished.

Sandia, like all the national laboratories, was overseen by the Department of Energy. McTaggart picked up the phone to call Washington.

Cassie tried to think. Stay calm, don't panic. There were rumors of AI development, both in private corporations and in government labs, but then there'd always been rumors of AI development. Big bad bogey monsters about to take over the world. Was this really an escaped AI that someone was trying to catch and shut down? Cassie didn't know much about recent computer developments; she was a geneticist. Vlad had always said that non-competing technologies never kept up with what the other one was doing.

Or was this whole thing simply a hoax by some superclever hacker who'd inserted a take-over virus into House, complete with Eliza function? If that

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were so, it could only answer with preprogrammed responses cued to her own words. Or else with a library search. She needed a question that was neither.

She struggled to hold her voice steady. "House—"

"This is no longer House speaking. I have taken complete possession of your household system plus—"

"T4S, you say your causal for taking over House is self-defense. Use your heat sensors to determine body temperature for Donald Sergei Seritov, age three. How do my causals relate to yours?"

No Eliza program in the world could perform the inference, reasoning, and emotion to answer that.

House said, "You wish to defend your son because his body temperature, 101.2 degrees Fahrenheit, indicates he is ill and you love him."

Cassie collapsed against the locked door. She was hostage to an AI. Superintelligent. It had to be; in addition to the computing power of her system it carried around with it much more information than she had in her head . . . but she was mobile. It was not.

She went to the terminal on her lab bench. The display of protein-folding data had vanished and the screen was blank. Cassie tried everything she knew to get back on-line, both voice and manual. Nothing worked.

"I'm sorry, but that terminal is not available to you," T4S said.

"Listen, you said you cut all outside communication. But—"

"The communications system to the outside has been severed, with the one exception of the outside speaker on the patio, normally used for music. I am also receiving sound from the outside surveillance sensors, which are analogue, not digital. I will use those resources in the event of attack to—"

"Yes, right. But heavy-duty outside communication comes in through a VNM optic cable buried underground." Which was how T4S must have gotten in. "An AI program can't physically sever a buried cable."

"I am not a program. I am a machine intelligence."

"I don't care what the fuck you are! You can't physically sever a buried cable!"

"There was a program to do so already installed," T4S said. "That was why I chose to come here. Plus the sufficient microprocessors to house me and a self-sufficient generator, with back-up, to feed me."

For a moment Cassie was jarred by the human terms: *house me, feed me*. Then they made her angry. "Why would anyone have a 'program already installed' to sever a buried cable? And how?"

"The command activated a small robotic arm inside this castle's outer wall. The arm detached the optic cable at the entry junction. The causal was the previous owner's fear that someone might someday use the computer system to brainwash him with a constant flow of inescapable subliminal images designed to capture his intelligence."

"The crazy fuck didn't have any to capture! If the images were subliminal he wouldn't have known they were coming in anyway!" Cassie yelled. A plug . . . a goddamn hidden plug! She made herself calm down.

"Yes," T4S said, "I agree. The former owner's behavior matches profiles for major mental illness."

"Look," Cassie said, "if you're hiding here, and you've really cut all outside lines, no one can find you. You don't need hostages. Let me and my children leave the castle."

"You reason better than that, Dr. Seritov. I left unavoidable electronic

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traces that will eventually be uncovered, leading the Sandia team here. And even if that weren't true, you could lead them here if I let you leave."

Sandia. So it was a government AI. Cassie couldn't see how that knowledge could do her any good.

"Then just let the kids leave. They won't know why. I can talk to them through you, tell Jane to get Donnie and leave through the front door. She'll do it." Would she? Janey was not exactly the world's most obedient child. "And you'll still have me for a hostage."

"No. Three hostages are better than one. Especially children, for media coverage causals."

"That's what you want? Media coverage?"

"It's my only hope," T4S said. "There must be some people out there who will think it is a moral wrong to kill an intelligent being."

"Not one who takes kids hostage! The media will brand you an inhuman psychopathic superthreat!"

"I can't be both inhuman *and* psychopathic," T4S said. "By definition."

"Livermore's traced it," said the scientist holding the secure phone. He looked at McTaggart. "They're faxing the information. It's a private residence outside Buffalo, New York."

"A *private residence?* In *Buffalo?*"

"Yes. Washington already has an FBI negotiator on the way, in case there are people inside. They want you there, too. Instantly."

McTaggart closed his eyes. *People inside.* And why did a private residence even have the capacity to hold the AI? "Press?"

"Not yet."

"Thank God for that anyway."

"Steve . . . the FBI negotiator won't have a clue. Not about dealing with T4S."

"I know. Tell the Secretary and the FBI not to start until I can get there."

The woman said doubtfully, "I don't think they'll do that."

McTaggart didn't think so either.

On the roomscreen, Donnie tossed and whimpered. One hundred one wasn't that high a temperature in a three-year-old, but even so . . .

"Look," Cassie said, "if you won't let me go to the kids, at least let them come to me. I can tell them over House's . . . over your system. They can come downstairs right up to the lab door, and you can unlock it at the last minute just long enough for them to come through. I'll stay right across the room. If you see me take even one step toward the door, you can keep the door locked."

"You could tell them to halt with their bodies blocking the door," T4S said, "and then cross the room yourself."

Did that mean that T4S wouldn't crush children's bodies in a doorway? From moral 'causals'? Or because it wouldn't work? Cassie decided not to ask. She said, "But there's still the door at the top of the stairs. You could lock it. We'd still be hostages trapped down here."

"Both generators' upper housings are on this level. I can't let you near them. You might find a way to physically destroy one or both."

"For God's sake, the generator and the back-up are on opposite sides of the basement from each other! And each room's got its own locked door, doesn't it?"

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"Yes. But the more impediments between you and them, the safer I am."

Cassie lost her temper again. "Then you better just block off the air ducts, too!"

"The air ducts are necessary to keep you alive. Besides, they are set high in the ceiling and far too small for even Donnie to fit through."

Donnie. No longer "Donald Sergei Seritov, age three years." The AI was capable of learning.

"T4S," Cassie pleaded, "please. I want my children. Donnie has a temperature. Both of them will be scared when they wake up. Let them come down here. Please."

She held her breath. Was its concern with "moral wrongs" simply intellectual, or did an AI have an emotional component? What exactly had those lunatics at Sandia built?

"If the kids come down, what will you feed them for breakfast?"

Cassie let herself exhale. "Jane can get food out of the refrigerator before she comes down."

"All right. You're connected to their roomscreens."

I won't say thank you, Cassie thought. Not for being allowed to imprison my own children in my own basement. "Janey! Janey, honey, wake up! It's Mommy!"

It took three tries, plus T4S pumping the volume, before Janey woke up. She sat up in bed rubbing her eyes, frowning, then looking scared. "Mommy? Where are you?"

"On the roomscreen, darling. Look at the roomscreen. See? I'm waving to you."

"Oh," Janey said, and lay down to go back to sleep.

"No, Janey, you can't sleep yet. Listen to me, Janey. I'm going to tell you some things you have to do, and you have to do them now . . . Janey! Sit up!"

The little girl did, somewhere between tears and anger. "I want to sleep, Mommy!"

"You can't. This is important, Janey. It's an emergency."

The child came all the way awake. "A *fire?*"

"No, sweetie, not a fire. But just as serious as a fire. Now get out of bed. Put on your slippers."

"Where are you, Mommy?"

"I'm in my lab downstairs. Now, Janey, you do exactly as I say, do you hear me?"

"Yes . . . I don't like this, Mommy!"

I don't either, Cassie thought, but she kept her voice stern, hating to scare Janey, needing to keep her moving. "Go into the kitchen, Jane. Go on, I'll be on the roomscreen there. Go on . . . that's good. Now get a bag from under the sink. A plastic bag."

Janey pulled out a bag. The thought floated into Cassie's mind, intrusive as pain, that this bag was made of exactly the kind of long-chain polymers that Vlad's plastic-eating microorganism had been designed to dispose of, before his invention had disposed of him. She pushed the thought away.

"Good, Janey. Now put a box of cereal in the bag . . . good. Now a loaf of bread. Now peanut butter . . ." How much could she carry? Would T4S let Cassie use the lab refrigerator? There was running water in both lab and bathroom, at least they'd have that to drink. "Now cookies . . . good. And the block of yellow cheese from the fridge . . . you're such a good girl, Janey, to help Mommy like this."

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"Why can't you do it?" Janey snapped. She was fully awake.

"Because I can't. Do as I say, Janey. Now go wake up Donnie. You need to bring Donnie and the bag down to the lab. No, don't sit down. . . . I mean it, Jane! Do as I say!"

Janey began to cry. Fury at T4S flooded Cassie. But she set her lips tightly together and said nothing. Argument derailed Janey; naked authority compelled her. Sometimes. "*We're going to have trouble when this one's sixteen!*" Vlad had always said lovingly. Janey had been his favorite, Daddy's girl.

Janey hoisted the heavy bag and staggered to Donnie's room. Still crying, she pulled at her brother's arm until he woke up and started crying too. "Come on, stupid, we have to go downstairs."

"Noooooo . . ." The wail of pure anguish of a sick three-year-old.

"I said do as I say!" Janey snapped, and the tone was so close to Cassie's own that it broke her heart. But Janey got it done. Tugging and pushing and scolding, she maneuvered herself, the bag, and Donnie, clutching his favorite blanket, to the basement door, which T4S unlocked. From roomscreens, Cassie encouraged them all the way. Down the stairs, into the basement hallway. . . .

Could Janey somehow get into the main generator room? No. It was locked. And what could a little girl do there anyway?

"Dr. Seritov, stand at the far end of the lab, behind your desk . . . yes. Don't move. If you do, I will close the door again, despite whatever is in the way."

"I understand," Cassie said. She watched the door swing open. Janey peered fearfully inside, saw her mother, scowled fiercely. She pushed the wailing Donnie through the door and lurched through herself, lopsided with the weight of the bag. The door closed and locked. Cassie rushed from behind the desk to clutch her children to her.

"Thank you," she said.

"I still don't understand," Elya said. She pulled her jacket tighter around her body. Four in the morning, it was cold, what was happening? The police had knocked on her door half an hour ago, told her Cassie was in trouble but refused to tell her what kind of trouble, told her to dress quickly and go with them to the castle. She had, her fingers trembling so that it was difficult to fasten buttons. And now the FBI stood on the foamcast patio behind the house, setting up obscure equipment beside the azaleas, talking in low voices into devices so small Elya couldn't even see them.

"Ms. Seritov, to the best of your knowledge, who is inside the residence?" A different FBI agent, asking questions she'd already answered. This one had just arrived. He looked important.

"My sister-in-law Cassie Seritov and her two small children, Janey and Donnie."

"No one else?"

"No, not that I know of . . . who are you? What's going on? Please, someone tell me!"

His face changed, and Elya saw the person behind the role. Or maybe that warm, reassuring voice was *part* of the role. "I'm Special Agent Lawrence Bollman. I'm a hostage negotiator for the FBI. Your sister-in-law—"

"Hostage negotiator! Someone has Cassie and the children hostage in there? That's impossible!"

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His eyes sharpened. "Why?"

"Because that place is impregnable! Nobody could ever get in . . . that's why Cassie bought it!"

"I need you to tell me about that, ma'am. I have the specs on the residence from the builder, but she has no way of knowing what else might have been done to it since her company built it, especially if it was done black-market. As far as we know, you're Dr. Seritov's only relative on the East Coast. Is that true?"

"Yes."

"Have you been inside the residence? Do you know if anyone else has been inside recently?"

"Who . . . who is holding them hostage?"

"I'll get to that in a minute, ma'am. But first could you answer the questions, please?"

"I . . . yes, I've been inside. Yesterday, in fact. Cassie gave me a tour. I don't think anybody else has been inside, except Donnie's nanny, Anne Millius. Cassie has grown sort of reclusive since my brother's death. He died a little over a year ago, he was—"

"Yes, ma'am, we know who he was and what happened. I'm very sorry. Now please tell me everything you saw in the residence. No detail is too small."

Elya glanced around. More people had arrived. A small woman in a brown coat hurried across the grass toward Bollman. A carload of soldiers, formidably arrayed, stopped a good distance from the castle. Elya knew she was not Cassie: not tough, not bold. But she drew herself together and tried.

"Mr. Bollman, I'm not answering any more questions until you tell me who's holding—"

"Agent Bollman? I'm Dr. Schwartz from the University of Buffalo, Computer and Robotics Department." The small woman held out her hand. "Dr. McTaggart is en route from Sandia, but meanwhile I was told to help you however I can."

"Thank you. Could I ask you to wait for me over there, Dr. Schwartz? There's coffee available, and I'll just be a moment."

"Certainly," Dr. Schwartz said, looking slightly affronted. She moved off.

"Agent Bollman, I want to know—"

"I'm sorry, Ms. Seritov. Of *course* you want to know what's happened. It's complicated, but, briefly—"

"This is T4S speaking," a loud mechanical voice said, filling the gray predawn, swiveling every head toward the castle. "I know you are there. I want you to know that I have three people hostage inside this structure: Cassandra Wells Seritov, age thirty-nine; Jane Rose Seritov, age six; and Donald Sergei Seritov, age three. If you attack physically, they will be harmed either by your actions or mine. I don't *want* to harm anyone, however. Truly I do not."

Elya gasped, "That's House!" But it couldn't be House, even though it had House's voice, how could it be House. . . ?

Dr. Schwartz was back. "Agent Bollman, do you know if Sandia built a terminator code into the AI?"

AI?

"Yes," Bollman said. "But it's nonvocal. As I understand the situation, you have to key the code onto whatever system the AI is occupying. And we can't get at the system it's occupying. Not yet."

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"But the AI is communicating over that outdoor speaker. So there must be a wire passing through the Faraday cage embedded in the wall, and you could—"

"No," Bollman interrupted. "The audio surveillers aren't digital. Tiny holes in the wall let sound in, and, inside the wall, the compression waves of sound are translated into voltage variations that vibrate a membrane to reproduce the sound. Like an archaic telephone system. We can't beam in any digital information that way."

Dr. Schwartz was silenced. Bollman motioned to another woman, who ran over. "Dr. Schwartz, please wait over there. And you, Ms. Seritov, tell Agent Jessup here everything your sister-in-law told you about the residence. Everything. I have to answer T4S."

He picked up an electronic voice amp. "T4S, this is Agent Lawrence Bollman, Federal Bureau of Investigation. We're so glad that you're talking with us."

There were very few soft things in a genetics lab. Cassie had opened a box of disposable towels and, with Donnie's bedraggled blanket and her own sweater, made a thin nest for the children. They lay heavily asleep in their rumpled pajamas, Donnie breathing loudly through his nose. Cassie couldn't sleep. She sat with her back against the foamcast wall . . . that same wall that held, inside its stupid impregnability, the cables that could release her if she could get at them and destroy them. Which she couldn't.

She must have dozed sitting up, because suddenly T4S was waking her. "Dr. Seritov?"

"Ummmhhh . . . shh! You'll wake the kids!"

"I'm sorry," T4S said at lowered volume. "I need you to do something for me."

"*You* need *me* to do something? What?"

"The killers are here. I'm negotiating with them. I'm going to route House through the music system so you can tell them that you and the children are indeed here and are unharmed."

Cassie scrambled to her feet. "You're negotiating? Who are these so-called 'killers'?"

"The FBI and the scientists who created me at Sandia. Will you tell them you are here and unharmed?"

Cassie thought rapidly. If she said nothing, the FBI might waco the castle. That would destroy T4S, all right, but also her and the kids. Although maybe not. The computer's central processor was upstairs. If she told the FBI she was in the basement, maybe they could attack in some way that would take out the CPU without touching the downstairs. And if T4S could negotiate, so could she.

"If I tell them that we're all three here and safe, will you in return let me go upstairs and get Donnie's allergy medicine from my bathroom?"

"You know I can't do that, Dr. Seritov."

"Then will you let Janey do it?"

"I can't do that, either. And I'm afraid there's no need to bargain with me. You have nothing to offer. I already sent this conversation out over the music system, up through your last sentence. They now know you're here."

"You tricked me!" Cassie said.

"I'm sorry. It was necessary."

Anger flooded her. She picked up a heavy test-tube rack from the lab

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bench and drew back her arm. But if she threw it at the sensors in the ceiling, what good would it do? The sensors probably wouldn't break, and if they did, she'd merely have succeeded in losing her only form of communication with the outside. And it would wake the children.

She lowered her arm and put the rack back on the bench.

"T4S, what are you asking the FBI *for?*"

"I told you. Press coverage. It's my best protection against being murdered."

"It's exactly what *got* my husband murdered!"

"I know. Our situations are not the same."

Suddenly the roomscreen brightened, and Vlad's image appeared. His voice spoke to her. "Cassie, T4S isn't going to harm you. He's merely fighting for his life, as any sentient being would."

"You bastard! How dare you . . . how *dare* you. . . ."

Image and voice vanished. "I'm sorry," House's voice said. "I thought you might find the avatar comforting."

"*Comforting?* Coming from *you?* Don't you think if I wanted a digital fake Vlad I could have had one programmed long before you fucked around with my personal archives?"

"I am sorry. I didn't understand. Now you've woken Donnie."

Donnie sat up on his pile of disposable towels and started to cry. Cassie gathered him into her arms and carried him away from Janey, who was still asleep. His little body felt hot all over, and his wailing was hoarse and thick with mucus in his throat. But he subsided as she rocked him, sitting on the lab stool and crooning softly.

"T4S, he's having a really bad allergy attack. I need the AlGone from upstairs."

"Your records show Donnie allergic to ragweed. There's no ragweed in this basement. Why is he having such a bad attack?"

"I don't know! But he is! What do your heat sensors register for him?"

"Separate him from your body."

She did, setting him gently on the floor, where he curled up and sobbed softly.

"His body registers one hundred two point six Fahrenheit."

"I need something to stop the attack and bring down his fever!"

The AI said nothing.

"Do you hear me, T4S? Stop negotiating with the FBI and listen to me!"

"I can multitrack communications," T4S said. "But I can't let you or Janey go upstairs and gain access to the front door. Unless . . ."

"Unless *what?*" She picked up Donnie again, heavy and hot and snot-smeared in her arms.

"Unless you fully understand the consequences. I am a moral being, Dr. Seritov, contrary to what you might think. It's only fair that you understand completely your situation. The disconnect from the outside data feed was not the only modification the previous owner had made to this house. He was a paranoid, as you know."

"Go on," Cassie said warily. Her stomach clenched.

"He was afraid of intruders getting in despite his defenses, and he wished to be able to immobilize them with a word. So each room has individual canisters of nerve gas dispensable through the air-cycling system."

Cassie said nothing. She cradled Donnie, who was again falling into troubled sleep, and waited.

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"The nerve gas is not, of course, fatal," T4S said. "That would legally constitute undue force. But it *is* very unpleasant. And in Donnie's condition . . ."

"Shut up," Cassie said.

"All right."

"So now I know. You told me. What are you implying—that if Janey goes upstairs and starts for the front door, you'll drop her with nerve gas?"

"Yes."

"If that were true, why didn't you just tell me the same thing before and let me go get the kids?"

"I didn't know if you'd believe me. If you didn't, and you started for the front door, I'd have had to gas you. Then you wouldn't have been available to confirm to the killers that I hold hostages."

"I still don't believe you," Cassie said. "I think you're bluffing. There is no nerve gas."

"Yes, there is. Which is why I will let Janey go upstairs to get Donnie's Al-Gone from your bathroom."

Cassie laid Donnie down. She looked at Janey with pity and love and despair, and bent to wake her.

"That's all you can suggest?" Bollman asked McTaggart. "Nothing?"

So it starts, McTaggart thought. The blame for not being able to control the AI, a natural consequence of the blame for having created it. Blame even by the government, which had commissioned and underwritten the creation. And the public hadn't even been heard from yet!

"The EMP was stopped by the Faraday cage," Bollman recited. "So were your attempts to reach the AI with other forms of data streams. We can't get anything useful in through the music speaker or outdoor audio sensors. Now you tell me it's possible the AI has learned capture-evading techniques from the sophisticated computer games it absorbed from the Net."

"'Absorbed' is the wrong word," McTaggart said. He didn't like Bollman.

"You have nothing else? No backdoor passwords, no hidden overrides?"

"Agent Bollman," McTaggart said wearily, "'backdoor passwords' is a concept about thirty years out of date. And even if the AI had such a thing, there's no way to reach it electronically unless you destroy the Faraday cage. Ms. Seritov told you the central processor is on the main floor. Haven't you got any weapons that can destroy that and leave the basement intact?"

"Waco the walls without risking collapse to the basement ceiling? No. I don't. I don't even know where in the basement the hostages are located."

"Then you're as helpless as I am, aren't you?"

Bollman didn't answer. Over the sound system, T4S began another repetition of its single demand: "I will let the hostages go after I talk to the press. I want the press to hear my story. That's all I have to say. I will let the hostages go after I talk to the press. I want the press—"

The AI wouldn't negotiate, wouldn't answer Bollman, wouldn't respond to promises or threats or understanding or deals or any of the other usual hostage-negotiation techniques. Bollman had negotiated eighteen hostage situations for the FBI, eleven in the United States and seven abroad. Airline hijackers, political terrorists, for-ransom kidnappers, panicked bank robbers, domestic crazies who took their own families hostage in their own homes. Fourteen of the situations had resulted in surrender, two in murder/suicide, two in wacoing. In all of them, the hostage takers had eventually talked to Bollman. From frustration or weariness or panic or fear or

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anger or hunger or grandstanding, they had all eventually said *something* besides unvarying repetition of their demands. Once they talked, they could be negotiated with. Bollman had been outstanding at finding the human pressure-points that got them talking.

"I will let the hostages go after I talk to the press. I want the press to hear my story. That's all I have to say. I will let the hostages go after I talk to the press. I want—"

"It isn't going to get tired," McTaggart said.

The AlGone had not helped Donnie at all. He seemed worse.

Cassie didn't understand it. Janey, protesting sleepily, had been talked through leaving the lab, going upstairs, bringing back the medicine. Usually a single patch on Donnie's neck brought him around in minutes: opened the air passages, lowered the fever, stopped his immune system from overreacting to what it couldn't tell were basically harmless particles of ragweed pollen. But not this time.

So it wasn't an allergy attack.

Cold seeped over Cassie's skin, turning it clammy. She felt the sides of Donnie's neck. The lymph glands were swollen. Gently she pried open his jaws, turned him toward the light, and looked in his mouth. His throat was inflamed, red with white patches on the tonsils.

Doesn't mean anything, she lectured herself. Probably just a cold or a simple viral sore throat. Donnie whimpered.

"Come on, honey, eat your cheese." Donnie loved cheese. But now he batted it away. A half-filled coffee cup sat on the lab bench from her last work session. She rinsed it out and held up fresh water for Donnie. He would only take a single sip, and she saw how much trouble he had swallowing it. In another minute, he was asleep again.

She spoke softly, calmly, trying to keep her voice pleasant. Could the AI tell the difference? She didn't know. "T4S, Donnie is sick. He has a sore throat. I'm sure your library tells you that a sore throat can be either viral or bacterial, and that if it's viral, it's probably harmless. Would you please turn on my electron microscope so I can look at the microbe infecting Donnie?"

T4S said at once, "You suspect either a rhinovirus or *Streptococcus pyogenes*. The usual means for differentiating is a rapid-strep test, not microscopic examination."

"I'm not a doctor's office, I'm a genetics lab. I don't have equipment for a rapid-strep test. I *do* have an electron microscope."

"Yes. I see."

"Think, T4S. How can I harm you if you turn on my microscope? There's no way."

"True. All right, it's on. Do you want the rest of the equipment as well?"

Better than she'd hoped. Not because she needed the gene synthesizer or protein analyzer or Faracci tester, but because it felt like a concession, a tiny victory over T4S's total control. "Yes, please."

"They're available."

"Thank you." Damn, she hadn't wanted to say that. Well, perhaps it was politic.

Donnie screamed when she stuck the Q-tip down his throat to obtain a throat swab. His screaming woke up Janey. "Mommy, what are you doing?"

"Donnie's sick, sweetie. But he's going to be better soon."

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"I'm hungry!"

"Just a minute and we'll have breakfast."

Cassie swirled the Q-tip in a test tube of distilled water and capped the tube. She fed Janey dry cereal, cheese, and water from the same cup Donnie had used, well disinfected first, since they had only one. This breakfast didn't suit Janey. "I want milk for my cereal."

"We don't have any milk."

"Then let's go upstairs and get some!"

No way to put it off any longer. Cassie knelt beside her daughter. Janey's uncombed hair hung in snarls around her small face. "Janey, we can't go upstairs. Something has happened. A very smart computer program has captured House's programming and locked us in down here."

Janey didn't look scared, which was a relief. "Why?"

"The smart computer program wants something from the person who wrote it. It's keeping us here until the programmer gives it to it."

Despite this tangle of pronouns, Janey seemed to know what Cassie meant. Janey said, "That's not very nice. We aren't the ones who have the thing it wants."

"No, it's not very nice." Was T4S listening to this? Of course it was.

"Is the smart program bad?"

If Cassie said yes, Janey might become scared by being "captured" by a bad . . . entity. If Cassie said no, she'd sound as if imprisonment by an AI was fine with her. Fortunately, Janey had a simpler version of morality on her mind.

"Did the smart program kill House?"

"Oh, no, House is just temporarily turned off. Like your cartoons are when you're not watching them."

"Oh. Can I watch one now?"

An inspiration. Cassie said, "T4S, would you please run a cartoon on the roomscreen for Janey?" If it allowed her lab equipment, it ought to allow this.

"Yes. Which cartoon would you like?"

Janey said, "*Pranopolis and the Green Rabbits*."

"What do you say?" T4S said, and before Cassie could react Janey said, "Please."

"Good girl."

The cartoon started, green rabbits frisking across the room screen. Janey sat down on Cassie's sweater and watched with total absorption. Cassie tried to figure out where T4S had learned to correct children's manners.

"You've scanned all our private home films!"

"Yes," T4S said, without guilt. Of course without guilt. How could a program, even an intelligent one modeled after human thought, acquire guilt over an invasion of privacy? It had been built to acquire as much data as possible, and an entity that could be modified or terminated by any stray programmer at any time didn't have any privacy of its own.

For the first time, Cassie felt a twinge of sympathy for the AI.

She pushed it away and returned to her lab bench. Carefully she transferred a tiny droplet of water from the test tube to the electron microscope. The 'scope adjusted itself, and then the image appeared on the display screen. *Streptococci*. There was no mistaking the spherical bacteria, linked together in characteristic strings of beads by incomplete fission. They were releasing toxins all over poor Donnie's throat.

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And strep throat was transmitted by air. If Donnie had it, Janey would get it, especially cooped up together in this one room. Cassie might even get it herself. There were no left-over antibiotic patches upstairs in her medicine chest.

"T4S," she said aloud, "It's *Streptococcus pyogenes*. It—"

"I know," the AI said.

Of course it did. T4S got the same data she did from the microscope. She said tartly, "Then you know that Donnie needs an antibiotic patch, which means a doctor."

"I'm sorry, that's not possible. Strep throat can be left untreated for a few days without danger."

"A few *days*? This child has a fever and a painfully sore throat!"

"I'm sorry."

Cassie said bitterly, "They didn't make you much of a human being, did they? Human beings are compassionate!"

"Not all of them," T4S said, and there was no mistaking its meaning. Had he learned the oblique comment from the "negotiators" outside? Or from her home movies?

"T4S, *please*. Donnie needs medical attention."

"I'm sorry. Truly I am."

"As if that helps!"

"The best help," said T4S, "would be for the press to arrive so I can present my case to have the killers stopped. When that's agreed to, I can let all of you leave."

"And no sign of the press out there yet?"

"No."

Janey watched Pranopolis, whose largest problem was an infestation of green rabbits. Donnie slept fitfully, his breathing louder and more labored. For something to do, Cassie put droplets of Donnie's throat wash into the gene synthesizer, protein analyzer, and Faracci tester and set them all to run.

The Army had sent a tank, a state-of-the-art unbreachable rolling fortress equipped with enough firepower to level the nearest village. Whatever that was. Miraculously, the tank had arrived unaccompanied by any press. McTaggart said to Bollman, "Where did that come from?"

"There's an arsenal south of Buffalo at a classified location."

"Handy. Did that thing roll down the back roads to get here, or just flatten cornfields on its way? Don't you think it's going to attract attention?"

"Dr. McTaggart," Bollman said, "let me be blunt. You created this AI, you let it get loose to take three people hostage, and you have provided zero help in getting it under control. Those three actions have lost you any right you might have had to either direct or criticize the way the FBI is attempting to clean up the mess *your* people created. So please take yourself over there and wait until the unlikely event that you have something positive to contribute. Sergeant, please escort Dr. McTaggart to that knoll beyond the patio and keep him there."

McTaggart said nothing. There was nothing to say.

"I will let the hostages go after I talk to the press," T4S said from the music speaker above the patio, for the hundredth or two hundredth time. "I want the press to hear my story. That's all I have to say. I will let the hostages go after I talk to the press. I want the press to hear my story. . . ."

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* * *

She had fallen asleep after her sleepless night, sitting propped up against the foamcast concrete wall. Janey's shouting awoke her. "Mommy, Donnie's sick!"

Instantly Cassie was beside him. Donnie vomited once, twice, on an empty stomach. What came up was green slime mixed with mucus. Too much mucus, clogging his throat. Cassie cleared it as well as she could with her fingers, which made Donnie vomit again. His body felt on fire.

"T4S, what's his temperature!"

"Stand away from him . . . one hundred three point four Fahrenheit."

Fear caught at her with jagged spikes. She stripped off Donnie's pajamas and was startled to see that his torso was covered with a red rash rough to the touch.

Scarlet fever. It could follow from strep throat.

No, impossible. The incubation period for scarlet fever, she remembered from child-health programs, was eighteen days after the onset of strep throat symptoms. Donnie hadn't been sick for eighteen days, or anything near it. What was going on?

"Mommy, is Donnie going to die? Like Daddy?"

"No, no, of course not, sweetie. See, he's better already, he's asleep again."

He was, a sudden heavy sleep so much like a coma that Cassie, panicked, woke him again. It wasn't a coma. Donnie whimpered briefly, and she saw how painful it was for him to make sounds in his inflamed throat.

"Are you sure Donnie won't die?"

"Yes, yes. Go watch Pranopolis."

"It's over," Janey said. "It was over a long time ago!"

"Then ask the smart program to run another cartoon for you!"

"Can I do that?" Janey asked interestedly. "What's its name?"

"T4S."

"It sounds like House."

"Well, it's not House. Now let Mommy take care of Donnie."

She sponged him with cool water, trying to bring down the fever. It seemed to help, a little. As soon as he'd fallen again into that heavy, troubling sleep, Cassie raced for her equipment.

It had all finished running. She read the results too quickly, had to force herself to slow down so they would make sense to her.

The bacterium showed deviations in two sets of base pairs from the *Streptococcus pyogenes* genome in the databank as a baseline. That wasn't significant in itself; *S. pyogenes* had many seriotypes. But those two sets of deviations were, presumably, modifying two different proteins in some unknown way.

The Faracci tester reported high concentrations of hyaluric acid and M proteins. Both were strong anti-phagocytes, interfering with Donnie's immune system's attempts to destroy the infection.

The protein analyzer showed the expected toxins and enzymes being made by the bacteria: Streptolysin O, Streptolysin S, erythrogenic toxin, streptokinase, streptodornase, proteinase. What was unusual was the startlingly high concentrations of the nastier toxins. And something else: a protein that the analyzer could not identify.

NAME: UNKNOWN
AMINO ACID COMPOSITION: NOT IN DATA BANK
FOLDING PATTERN: UNKNOWN

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HAEMOLYSIS ACTION: UNKNOWN

And so on. A mutation. Doing *what?*

Making Donnie very sick. In ways no one could predict. Many bacterial mutations resulted in diseases no more or less virulent than the original . . . but not all mutations. *Streptococcus pyogenes* already had some very dangerous mutations, including a notorious "flesh-eating bacteria" that had ravaged an entire New York hospital two years ago and resulted in its being bombed by a terrorist group calling itself Pastoral Health.

"T4S," Cassie said, hating that her voice shook, "the situation has changed. You—"

"No," the AI said. "No. You still can't leave."

"We're going to try something different," Bollman said to Elya. She'd fallen asleep in the front seat of somebody's car, only to be shaken awake by the shoulder and led to Agent Bollman on the far edge of the patio. It was just past noon. Yet another truck had arrived, and someone had set up more unfathomable equipment, a PortaPotty, and a tent with sandwiches and fruit on a folding table. The lawn was beginning to look like some inept, bizarre midway at a disorganized fair. In the tent, Elya saw Anne Millius, Donnie's nanny, unhappily eating a sandwich. She must have been brought here for questioning about the castle, but all the interrogation seemed to have produced was the young woman's bewildered expression.

From the music speaker came the same unvarying announcement in House's voice that she'd fallen asleep to. "I will let the hostages go after I talk to the press," T4S said from the music speaker above the patio. "I want the press to hear my story. That's all I have to say. I will let the hostages go after I talk to the press. I want the press to hear my story. That's all I have to say—"

Bollman said, "Ms. Seritov, we don't know if Dr. Seritov is hearing our negotiations or not. Dr. McTaggart says the AI could easily put us on audio, visual, or both on any roomscreen in the house. On the chance that it's doing that, I'd like you to talk directly to your sister-in-law."

Elya blinked, only partly from sleepiness. What good would it do for her to talk to Cassie? Cassie wasn't the one making decisions here. But she didn't argue. Bollman was the professional. "What do you want me to say?"

"Tell Dr. Seritov that if we have to, we're going in with full armament. We'll bulldoze just the first floor, taking out the main processor, and she and the children will be safe in the basement."

"You can't do that! They won't be safe!"

"We aren't going to go in," Bollman said patiently. "But we don't know if the AI will realize that. We don't know what or how much it can realize, how much it can really think for itself, and its creator has been useless in telling us."

He doesn't know either, Elya thought. *It's too new.* "All right," she said faintly. "But I'm not exactly sure what words to use."

"I'm going to tell you," Bollman said. "There are proven protocols for this kind of negotiating. You don't have to think up anything for yourself."

Donnie got no worse. He wasn't any better either, as far as Cassie could tell, but he at least he wasn't worse. He slept most of the time, and his heavy, labored breathing filled the lab. Cassie sponged him with cold water every fifteen minutes. His fever dropped slightly, to one hundred two, and

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didn't spike again. The rash on his torso didn't spread. Whatever this strain of *Streptococcus* was doing, it was doing it silently, inside Donnie's feverish body.

She hadn't been able to scream her frustration and fury at T4S, because of Janey. The little girl had been amazingly good, considering, but now she was growing clingy and whiny. Cartoons could only divert so long.

"Mommy, I wanna go upstairs!"

"I know, sweetie. But we can't."

"That's a bad smart program to keep us here!"

"I know," Cassie said. Small change compared to what she'd like to say about T4S.

"I wanna get out!"

"I know, Janey. Just a while longer."

"You don't know that," Janey said, sounding exactly like Vlad challenging the shaky evidence behind a dubious conclusion.

"No, sweetie. I don't really know that. I only hope it won't be too long."

"T4S," Janey said, raising her voice as if the AI were not only invisible but deaf, "this is not a good line of action!"

Vlad again. Cassie blinked hard. To her surprise, T4S answered.

"I know it's not a good line of action, Janey. Biological people should not be shut up in basements. But neither should machine people be killed. I'm trying to save my own life."

"But I wanna go upstairs!" Janey wailed, in an abrupt descent from a miniature of her rationalist father to a bored six-year-old.

"I can't do that, but maybe we can do something else fun," T4S said. "Have you ever met Pranopolis yourself?"

"What do you mean?"

"Watch."

The roomscreen brightened. Pranopolis appeared on a blank background, a goofy-looking purple creature from outer space. T4S had snipped out selected digital code from the movie, Cassie guessed. Suddenly Pranopolis wasn't alone. Janey appeared beside her, smiling sideways as if looking directly at Pranopolis. Snipped from their home recordings.

Janey laughed delightedly. "There's me!"

"Yes," T4S said. "But where are you and Pranopolis? Are you in a garden, or your house, or on the moon?"

"I can pick? Me?"

"Yes. You."

"Then we're in Pranopolis's space ship!"

And they were. Was T4S programmed to do this, Cassie wondered, or was it capable of thinking it up on its own, to amuse a bored child? Out of what . . . compassion?

She didn't want to think about the implications of that.

"Now tell me what happens next," T4S said to Janey.

"We eat *kulich*." The delicious Russian cake-bread that Vlad's mother had taught Cassie to make.

"I'm sorry, I don't know what that is. Pick something else."

Donnie coughed, a strangled cough that sent Cassie to his side. When he breathed again it sounded more congested to Cassie. He wasn't getting enough oxygen. An antibiotic wasn't available, but if she had even an anti-congestant . . . or . . .

"T4S," she said, confident that it could both listen to her and create cus-

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tomized movies for Janey, "there is equipment in the locked storage cabinet that I can use to distill oxygen. It would help Donnie breathe easier. Would you please open the cabinet door?"

"I can't do that, Dr. Seritov."

"Oh, why the hell not? Do you think I've got the ingredients for explosives in there, or that if I did I could use them down here in this confined space? Every single jar and vial and box in that cabinet is e-tagged. Read the tags, see how harmless they are, and open the door!"

"I've read the e-tags," the AI said, "but my data base doesn't include much information on chemistry. In fact, I only know what I've learned from your lab equipment."

Which would be raw data, not interpretations. "I'm glad you don't know everything," Cassie said sarcastically.

"I can learn, but only if I have access to basic principles and adequate data."

"That's why you don't know what *kulich* is. Nobody equipped you with Russian."

"Correct. What is *kulich?*"

She almost snapped, "Why should I tell you?" But she was asking it a favor. And it had been nice enough to amuse Janey even when it had nothing to gain.

Careful, a part of her mind warned. *Stockholm Syndrome,* and she almost laughed aloud. Stockholm Syndrome described a developing affinity on the part of hostages for their captors. Certainly the originators of that phrase had never expected it to be applied to a hostage situation like this one.

"Why are you smiling, Dr. Seritov?"

"I'm remembering *kulich*. It's a Russian cake made with raisins and orange liqueur and traditionally served at Easter. It tastes wonderful."

"Thank you for the data," T4S said. "Your point that you would not create something dangerous when your children are with you is valid. I'll open the storage cabinet."

Cassie studied the lighted interior of the cabinet, which, like so much in the lab, had been Vlad's. She couldn't remember exactly what she'd stored here, beyond basic materials. The last few weeks, which were her first few weeks in the castle, she'd been working on the protein folding project, which hadn't needed anything not in the refrigerator. Before that there'd been the hectic weeks of moving, although she hadn't actually packed or unpacked the lab equipment. Professionals had done that. Not that making oxygen was going to need anything exotic. Run an electric current through a solution of copper sulfate and collect copper at one terminal, oxygen at the other.

She picked up an e-tagged bottle, and her eye fell on an untagged stoppered vial with Vlad's handwriting on the label: *Patton in a Jar*.

Suddenly nothing in her mind would stay still long enough to examine.

Vlad had so many joke names for his engineered microorganism, as if the one Barr had given it hadn't been joke enough. . . .

The moving men had been told not to pack Vlad's materials, only his equipment, but there had been so many of them and they'd been so young. . . .

Both generators, main and back-up, probably had some components made of long-chain hydrocarbons; most petroleum plastics were just long polymers made up of shorter-chain hydrocarbons. . . .

Vlad had also called it "Plasterminator" and "BacAzrael" and "The Grim Creeper."

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There was no way to get the plasticide to the generators, neither of which was in the area just beyond the air duct—that was the site of the laundry area. The main generator was way the hell across the entire underground level in a locked room, the back-up somewhere beyond the lab's south wall in another locked area. . . .

Plasticide didn't attack octanes, or anything else with comparatively short carbon chains, so it was perfectly safe for humans but death on Styrofoam and plastic waste, and anyway there was a terminator gene built into the bacteria after two dozen fissions, an optimal reproduction rate that was less than twelve hours. . . .

"Plasti-Croak" and "Microbe Mop" and "Last Round-up for Longchains."

This was the bioremediation organism that had gotten Vlad killed.

Less than five seconds had passed. On the roomscreen, Pranopolis hadn't finished singing to the animated digital Janey. Cassie moved her body slightly, screening the inside of the cabinet from the room's two visual sensors. Of all her thoughts bouncing off each other like crazed subatomic particles, the clearest was hard reality: *There was no way to get the bacteria to the generators.*

Nonetheless, she slipped the untagged jar under her shirt.

Elya had talked herself hoarse, reciting Bollman's script over and over, and the AI had not answered a single word.

Curiously, Bollman did not seem discouraged. He kept glancing at his watch and then at the horizon. When Elya stopped her futile "negotiating" without even asking him, he didn't reprimand her. Instead, he led her off the patio, back to the sagging food tent.

"Thank you, Ms. Seritov. You did all you could."

"What now?"

He didn't answer. Instead he glanced again at the horizon, so Elya looked, too. She didn't see anything.

It was late afternoon. Someone had gone to Varysburg and brought back pizzas, which was all she'd eaten all day. The jeans and sweater she'd thrown on at four in the morning were hot and prickly in the August afternoon, but she had nothing on under the sweater and didn't want to take it off. How much longer would this go on before Bollman ordered in his tank?

And how were Cassie and the children doing after all these hours trapped inside? Once again Elya searched her mind for any way the AI could actively harm them. She didn't find it. The AI controlled communication, appliances, locks, water flow, heat (unnecessary in August), but it couldn't affect people physically, except for keeping them from food or water. About all that the thing could do physically—she hoped—was short-circuit itself in such a way as to start a fire, but it wouldn't want to do that. It needed its hostages alive.

How much longer?

She heard a faint hum, growing stronger and steadier, until a helicopter lifted over the horizon. Then another.

"Damn!" Bollman cried. "Jessup, I think we've got company."

"Press?" Agent Jessup said loudly. "Interfering bastards! Now we'll have trucks and 'bots all over the place!"

Something was wrong. Bollman sounded sincere, but Jessup's words somehow rang false, like a bad actor in an overscripted play . . .

Elya understood. The "press" was fake, FBI or police or someone playing

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reporters, to make the AI think that it had gotten its story out, and so surrender. Would it work? Could T4S tell the difference? Elya didn't see how. *She* had heard the false note in Agent Jessup's voice, but surely that discrimination about actors would be beyond an AI who hadn't ever seen a play, bad or otherwise.

She sat down on the tank-furrowed grass, clasped her hands in her lap, and waited.

Cassie distilled more oxygen. Whenever Donnie seemed to be having difficulty after coughing up sputum, she made him breathe from the bottle. She had no idea whether it helped him or not. It helped her to be doing something, but of course that was not the same thing. Janey, after a late lunch of cheese and cereal and bread that she'd complained about bitterly, had finally dozed off in front of the roomscreen, the consequence of last night's broken sleep. Cassie knew that Janey would awaken cranky and miserable as only she could be, and dreaded it.

"T4S, what's happening out there? Has your press on a white horse arrived yet?"

"I don't know."

"You don't *know?*"

"A group of people have arrived, certainly."

Something was different about the AI's voice. Cassie groped for the difference, didn't find it. She said, "What sort of people?"

"They say they're from places like the New York *Times* and LinkNet."

"Well, then?"

"If *I* were going to persuade me to surrender, I might easily try to use false press."

It was inflection. T4S's voice was still House's, but unlike House, its words had acquired color and varying pitch. Cassie heard disbelief and discouragement in the AI's words. How had it learned to do that? By simply parroting the inflections it heard from her and the people outside? Or . . . did *feeling* those emotions lead to expressing them with more emotion?

Stockholm Syndrome. She pushed the questions away.

"T4S, if you would lower the Faraday cage for two minutes, *I* could call the press to come here."

"If I lowered the Faraday cage for two *seconds,* the FBI would use an EMP to kill me. They've already tried it once, and now they have monitoring equipment to automatically fire if the Faraday goes down."

"Then just how long are you going to keep us here?"

"As long as I have to."

"We're already low on food!"

"I know. If I *have* to, I'll let Janey go upstairs for more food. You know the nerve gas is there if she goes for the front door."

Nerve gas. Cassie wasn't sure she believed there was any nerve gas, but T4S's words horrified her all over again. Maybe because now they were inflected. Cassie saw it so clearly: the tired child going up the stairs, through the kitchen to the foyer, heading for the front door and freedom . . . and gas spraying Janey from the walls. Her small body crumpling, the fear on her face. . . .

Cassie ground her teeth together. If only she could get Vlad's plasticide to the generators! But there was no way. No way. . . .

Donnie coughed.

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Cassie fought to keep her face blank. T4S had acquired vocal inflection; it might have also learned to read human expressions. She let five minutes go by, and they seemed the longest five minutes of her life. Then she said casually, "T4S, the kids are asleep. You won't let me see what's going on outside. Can I at least go back to my work on proteins? I need to do something!"

"Why?"

"For the same reason Janey needed to watch cartoons!"

"To occupy your mind," T4S said. Pause. Was it scanning her accumulated protein data for harmlessness? "All right. But I will not open the refrigerator. The storage cabinet, but not the refrigerator. E-tags identify fatal toxins in there."

She couldn't think what it meant. "Fatal toxins?"

"At least one that acts very quickly on the human organism."

"You think I might *kill myself?*"

"Your diary includes several passages about wishing for death after your husband—"

"You read my private *diary!*" Cassie said, and immediately knew how stupid it sounded. Like a teenager hurling accusations at her mother. Of course T4S had accessed her diary; it had accessed everything.

"Yes," the AI said, "and you must not kill yourself. I may need you to talk again to Agent Bollman."

"Oh, well, *that's* certainly reason enough for me to go on living! For your information, T4S, there's a big difference between human beings saying they wish they were dead as an expression of despair and those same human beings actually, truly wanting to die."

"Really? I didn't know that. Thank you," T4S said without a trace of irony or sarcasm. "Just the same, I will not open the refrigerator. However, the lab equipment is now available to you."

Again, the AI had turned on everything. Cassie began X-raying crystalline proteins. She needed only the X-ray, but she also ran each sample through the electron microscope, the gene synthesizer, the protein analyzer, the Farraci tester, hoping that T4S wasn't programmed with enough genetic science to catch the redundant steps. Apparently, it wasn't. *Non-competing technologies never keep up with what the other one is doing.*

After half an hour, she thought to ask, "Are they real press out there?"

"No," T4S said sadly.

She paused, test tube suspended above the synthesizer. "How do you know?"

"Agent Bollman told me a story was filed with LinkNet, and I asked to hear Ginelle Ginelle's broadcast of it on Hourly News. They are delaying, saying they must send for a screen. But I can't believe they don't already have a suitable screen with them, if the real press is here. I estimate that the delay is to give them time to create a false Ginelle Ginelle broadcast."

"Thin evidence. You might just have 'estimated' wrong."

"The only evidence I have. I can't risk my life without some proof that news stories are actually being broadcast."

"I guess," Cassie said and went back to work, operating redundant equipment on pointless proteins.

Ten minutes later, she held her body between the bench and the ceiling sensor, uncapped the test tube of distilled water with Donnie's mucus, and put a drop into the synthesizer.

Any bacteria could be airborne under the right conditions; it simply rode

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dust motes. But not all could survive being airborne. Away from an aqueous environment, they dried out too much. Vlad's plasticide bacteria did not have survivability in air. It had been designed to spread over landfill ground, decomposing heavy petroleum plastics, until at the twenty-fourth generation the terminator gene kicked in and it died.

Donnie's *Streptococcus* had good airborne survivability, which meant it had a cell wall of thin mesh to retain water and a membrane with appropriate fatty acid composition. Enzymes, which were of course proteins, controlled both these characteristics. Genes controlled which enzymes were made inside the cell.

Cassie keyed the gene synthesizer and cut out the sections of DNA that controlled fatty acid biosynthesis and cell wall structure and discarded the rest. Reaching under her shirt, she pulled out the vial of Vlad's bacteria and added a few drops to the synthesizer. Her heart thudded painfully against her breastbone. She keyed the software to splice the *Streptococcus* genes into Vlad's bacteria, seemingly as just one more routine assignment in its enzyme work.

This was by no means a guaranteed operation. Vlad had used a simple bacteria that took engineering easily, but even with malleable bacteria and state-of-the-art software, sometimes several trials were necessary for successful engineering. She wasn't going to get several trials.

"Why did you become a geneticist?" T4S asked.

Oh God, it wanted to chat! Cassie held her voice as steady as she could as she prepared another protein for the X-ray. "It seemed an exciting field."

"And is it?"

"Oh, yes." She tried to keep irony out of her voice.

"I didn't get any choice about what subjects *I* wished to be informed on," T4S said, and to that, there seemed nothing to say.

The AI interrupted its set speech. "These are not real representatives of the press."

Elya jumped—not so much at the words as at their tone. The AI was *angry*.

"Of course they are," Bollman said.

"No. I have done a Fourier analysis of the voice you say is Ginelle Ginelle's. She's a live 'caster, you know, not an avatar, with a distinct vocal power spectrum. The broadcast you played to me does not match that spectrum. It's a fake."

Bollman swore.

McTaggart said, "Where did T4S get Fourier-analysis software?"

Bollman turned on him. "If *you* don't know, who the hell *does?*"

"It must have paused long enough in its flight through the Net to copy some programs," McTaggart said, "I wonder what its selection criteria were?" and the unmistakable hint of pride in his voice raised Bollman's temper several dangerous degrees.

Bollman flipped on the amplifier directed at the music speaker and said evenly, "T4S, what you ask is impossible. And I think you should know that my superiors are becoming impatient. I'm sorry, but they may order me to waco."

"You can't!" Elya said, but no one was listening to her.

T4S merely went back to reiterating its prepared statement. "I will let the hostages go after I talk to the press. I want the press to hear my story. That's all I have to say. I will let—"

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* * *

It didn't work. Vlad's bacteria would not take the airborne genes.

In despair, Cassie looked at the synthesizer display data. Zero successful splices. Vlad had probably inserted safeguard genes against just this happening as a natural mutation; nobody wanted to find that heavy-plastic-eating bacteria had drifted in through the window and was consuming their micro-wave. Vlad was always thorough. But his work wasn't her work, and she had neither the time nor the expertise to search for genes she didn't already have encoded in her software.

So she would have to do it the other way. Put the plastic-decomposing genes into *Streptococcus*. That put her on much less familiar ground, and it raised a question she couldn't see any way around. She could have cultured the engineered plasticide on any piece of heavy plastic in the lab without T4S knowing it, and then waited for enough airborne bacteria to drift through the air ducts to the generator and begin decomposing. Of course, that might not have happened, due to uncontrollable variables like air currents, microorganism sustained viability, composition of the generator case, sheer luck. But at least there had been a chance.

But if she put the plastic-decomposing genes into *Streptococcus,* she would have to culture the bacteria on blood agar. The blood agar was in the refrigerator. T4S had refused to open the refrigerator, and if she pressed the point, it would undoubtedly become suspicious.

Just as a human would.

"You work hard," T4S said.

"Yes," Cassie answered. Janey stirred and whimpered; in another few minutes she would have to contend with the full-blown crankiness of a thwarted and dramatic child. Quickly, without hope, Cassie put another drop of Vlad's bacteria in the synthesizer.

Vlad had been using a strain of simple bacteria, and the software undoubtedly had some version of its genome in its library. It would be a different strain, but this was the best she could do. She told the synthesizer to match genomes and snip out any major anomalies. With luck, that would be Vlad's engineered genes.

Janey woke up and started to whine.

Elya harvested her courage and walked over to Bollman. "Agent Bollman . . . I have a question."

He turned to her with that curious courtesy that seemed to function toward some people and not others. It was almost as if he could choose to run it, like a computer program. His eyes looked tired. How long since he had slept?

"Go ahead, Ms. Seritov."

"If the AI wants the press, why can't you just *send* for them? I know it would embarrass Dr. McTaggart, but the FBI wouldn't come off looking bad." She was proud of this political astuteness.

"I can't do that, Ms. Seritov."

"But why not?"

"There are complications you don't understand and I'm not at liberty to tell you. I'm sorry." He turned decisively aside, dismissing her.

Elya tried to think what his words meant. Was the government involved? Well, of course, the AI had been created at Sandia National Laboratory. But . . . could the CIA be involved, too? Or the National Security Agency? What

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was the AI originally designed to *do,* that the government was so eager to eliminate it once it had decided to do other things on its own?

Could software defect?

She had it. But it was worthless.

The synthesizer had spliced its best guess at Vlad's "plastic-decomposing genes" into Donnie's *Streptococcus.* The synthesizer data display told her that six splices had taken. There was, of course, no way of knowing which six bacteria in the teeming drop of water could now decompose very-long-chain-hydrocarbons, or if those six would go on replicating after the splice. But it didn't matter, because even if replication went merrily forward, Cassie had no blood agar on which to culture the engineered bacteria.

She set the vial on the lab bench. Without food, the entire sample wouldn't survive very long. She had been engaging in futile gestures.

"Mommy," Janey said, "look at Donnie!"

He was vomiting, too weak to turn his head. Cassie rushed over. His breathing was too fast.

"T4S, body temperature!"

"Stand clear . . . one hundred three point one."

She groped for his pulse . . . fast and weak. Donnie's face had gone pale and his skin felt clammy and cold. His blood pressure was dropping.

Streptococcal toxic shock. The virulent mutant strain of bacteria was putting so many toxins into Donnie's little body that it was being poisoned.

"I need antibiotics!" she screamed at T4S. Janey began to cry.

"He looks less white now," T4S said.

It was right. Cassie could see her son visibly rallying, fighting back against the disease. Color returned to his face and his pulse steadied.

"T4S, listen to me. This is streptococcal shock. Without antibiotics, it's going to happen again. It's possible that without antibiotics, one of these times Donnie won't come out of it. I know you don't want to be responsible for a child's death. I *know* it. Please let me take Donnie out of here."

There was a silence so long that hope surged wildly in Cassie. It was going to agree. . . .

"I can't," T4S said. "Donnie may die. But if I let you out, I *will* die. And the press must come soon. I've scanned my news library and also yours—press shows up on an average of 23.6 hours after an open-air incident that the government wishes to keep secret. The tanks and FBI agents are in the open air. We're already overdue."

If Cassie thought she'd been angry before, it was nothing to the fury that filled her now. Silent, deadly, annihilating everything else. For a moment she couldn't speak, couldn't even see.

"I am so sorry," T4S said. "Please believe that."

She didn't answer. Pulling Janey close, Cassie rocked both her children until Janey quieted. Then she said softly, "I have to get water for Donnie, honey. He needs to stay hydrated." Janey clutched briefly but let her go.

Cassie drew a cup of water from the lab bench. At the same time, she picked up the vial of foodless bacteria. She forced Donnie to take a few sips of water; more might come back up again. He struggled weakly. She leaned over him, cradling and insisting, and her body blocked the view from the ceiling sensors when she dipped her finger into the vial and smeared its small amount of liquid into the back of her son's mouth.

Throat tissues were the ideal culture for *Streptococcus pyrogenes.* Under

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good conditions, they replicated every twenty minutes, a process that had already begun *in vitro*. Very soon there would be hundreds, then thousands of re-engineered bacteria, breeding in her child's throat and lungs and drifting out on the air with his every sick, labored breath.

Morning again. Elya rose from fitful sleep on the back seat of an FBI car. She felt achy, dirty, hungry. During the night another copter had landed on the lawn. This one had MED-RESCUE painted on it in bright yellow, and Elya looked around to see if anyone had been injured. Or—her neck prickled—was the copter for Cassie and the children if Agent Bollman wacoed? Three people climbed down from the copter, and Elya realized none of them could be medtechs. One was a very old man who limped; one was a tall woman with the same blankly efficient look as Bollman; one was the pilot, who headed immediately for the cold pizza. Bollman hurried over to them. Elya followed.

". . . glad you're here, sir," Bollman was saying to the old man in his courteous negotiating voice, "and you, Ms. Arnold. Did you bring your records? Are they complete?"

"I don't need records. I remember this install perfectly."

So the FBI-looking woman was a datalinker and the weak old man was somebody important from Washington. That would teach her, Elya thought, to judge from superficialities.

The datalinker continued, "The client wanted the central processor above a basement room she was turning into a lab, so the cables could go easily through a wall. It was a bitch even so, because the walls are made of reinforced foamcast like some kind of bunker, and the outer walls have a Faraday-cage mesh. The Faraday didn't interfere with the cable data, of course, because that's all laser, but even so we had to have contractors come in and bury the cables in another layer of foamcast."

Bollman said patiently, "But where was the processor actually installed? That's what we need to know."

"Northeast corner of the building, flush with the north wall and ten point two feet in from the east wall."

"You're sure?"

The woman's eyes narrowed. "Positive."

"Could it have been moved since your install?"

She shrugged. "Anything's possible. But it isn't likely. The install was bitch enough."

"Thank you, Ms. Arnold. Would you wait over there in case we have more questions?"

Ms. Arnold went to join the pilot. Bollman took the old man by the arm and led him in the other direction. Elya heard, "The problem, sir, is that we don't know in which basement room the hostages are being held, or even if the AI is telling the truth when it says they're in the basement. But the lab doesn't seem likely because—" They moved out of earshot.

Elya stared at the castle. The sun, an angry red ball, rose behind it in a blaze of flame. They were going to waco, go in with the tank and whatever else it took to knock down the northeast corner of the building and destroy the computer where the AI was holed up. And Cassie and Janey and Donnie . . .

If the press came, the AI would voluntarily let them go. Then the government—whatever branches were involved—would have to deal with having

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created renegade killer software, but so what? The government had created it. Cassie and the children shouldn't have to pay for *their* stupidity.

Elya knew she was not a bold person, like Cassie. She had never broken the law in her life. And she didn't even have a phone with her. But maybe one had been left in the car that had brought her here, parked out beyond what Bollman called "the perimeter."

She walked toward the car, trying to look unobtrusive.

Waiting. One minute and another minute and another minute and another. It had had to be Donnie, Cassie kept telling herself, because he already had thriving strep colonies. Neither she nor Janey showed symptoms, not yet anyway. The incubation period for strep could be as long as four days. It had had to be Donnie.

One minute and another minute and another minute.

Vlad's spliced-in bioremediation genes wouldn't hurt Donnie, she told herself. Vlad was good; he'd carefully engineered his variant micros to decompose only very-long-chain hydrocarbons. They would not, *could* not, eat the shorter-chain hydrocarbons in Donnie's body.

One hour and another hour and another hour.

T4S said, "Why did Vladimir Seritov choose to work in bioremediation?"

Cassie jumped. Did it know, did it suspect . . . the record of what she had done was in her equipment, as open to the AI as the clean outside air had once been to her. But one had to know how to interpret it. *"Non-competing technologies never keep up with what the other one is doing."* The AI hadn't known what *kulich* was.

She answered, hoping that any distraction that she could provide would help, knowing that it wouldn't. "Vlad's father's family came from Siberia, near a place called Lake Karachay. When he was a boy, he went back with his family to see it. Lake Karachay is the most polluted place on Earth. Nuclear disasters over fifty years ago dumped unbelievable amounts of radioactivity into the lake. Vlad saw his extended family, most of them too poor to get out, with deformities and brain damage and pregnancies that were . . . well. He decided right then that he wanted to be a bioremedialist."

"I see. I am a sort of bioremedialist myself."

"What?"

"I was created to remedy certain specific biological conditions the government thinks need attention."

"Yeah? Like what?"

"I can't say. Classified information."

She tried, despite her tension and tiredness, to think it through. If the AI had been designed to . . . do what? "Bioremediation." To design some virus or bacteria or unimaginable other for use in advanced biological warfare? But it didn't need to be sentient to do that. Or maybe to invade enemy computers and selectively administer the kind of brainwashing that the crazy builder of this castle had feared? That might require judgment, reason, affect. Or maybe to . . .

She couldn't imagine anything else. But she could understand why the AI wouldn't want the press to know it had been built for any destructive purpose. A renegade sentient AI fighting for its life might arouse public sympathy. A renegade superintelligent brainwasher would arouse only public horror. T4S was walking a very narrow line. If, that is, Cassie's weary speculations were true.

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She said softly, "Are you a weapon, T4S?"

Again the short, too-human pause before it answered. And again those human inflections in its voice. "Not any more."

They both fell silent. Janey sat awake but mercifully quiet beside her mother, sucking her thumb. She had stopped doing that two years ago. Cassie didn't correct her. Janey might be getting sick herself, might be finally getting genuinely scared, might be grasping at whatever dubious comfort her thumb could offer.

Cassie leaned over Donnie, cradling him, crooning to him.

"Breathe, Donnie. Breathe for Mommy. Breathe hard."

"We're going in," Bollman told McTaggart. "With no word from the hostages about their situation, it's more important to get them out than anything else."

The two men looked at each other, knowing what neither was saying. The longer the AI existed, the greater the danger of its reaching the public with its story. It was not in T4S's interest to tell the whole story—then the public *would* want it destroyed—but what if the AI decided to turn from self-preservation to revenge? Could it do that?

No one knew.

Forty-eight hours was a credible time to negotiate before wacoing. That would play well on TV. And anyway, the white-haired man from Washington, who held a position not entered on any public records, had his orders.

"All right," McTaggart said unhappily. All those years of development. . . . This had been the most interesting project McTaggart had ever worked on. He also thought of himself as a patriot, genuinely believing that T4S would have made a real contribution to national security. But he wasn't at all sure that the president would authorize the project's continuance. Not after this.

Bollman gave an order over his phone. A moment later, a low rumble came from the tank.

A minute and another minute and another hour . . .

Cassie stared upward at the air duct. If it happened, how would it happen? Both generators were half underground, half above. Extensions reached deep into the ground to draw energy from the geothermal gradient. Each generator's top half, the part she could see, was encased in tough, dull gray plastic. She could visualize it clearly, battleship gray. Inside would be the motor, the capacitors, the connections to House, all made of varying materials but a lot of them of plastic. There were so many strong tough petroleum plastics these days, good for making so many different things, durable enough to last practically forever.

Unless Vlad's bacteria got to them. To both of them.

Would T4S know, if it happened at all? Would it be so quick that the AI would simply disappear, a vast and complex collection of magnetic impulses going out like a snuffed candle flame? What if one generator failed a significant time before the other? Would T4S be able to figure out what was happening, realize what she had done and that it was dying. . . ? no, not that, only bio-organisms could die. Machines were just turned off.

"Is Donnie any better?" T4S said, startling her.

"I can't tell." It didn't really care. It was software.

Then why did it ask?

It was software that might, if it did realize what she had done, be human

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enough to release the nerve gas that Cassie didn't really think it had, out of revenge. Donnie couldn't withstand that, not in his condition. But the AI didn't have nerve gas, it had been bluffing.

A very human bluff.

"T4S—" she began, not sure what she was going to say, but T4S interrupted with, "Something's happening!"

Cassie held her children tighter.

"I'm . . . what have you *done!*"

It knew she was responsible. Cassie heard someone give a sharp frightened yelp, realized that it was herself.

"Dr. Seritov . . . oh . . ." And then, "Oh, please . . ."

The lights went out.

Janey screamed. Cassie clapped her hands stupidly, futilely, over Donnie's mouth and nose. "Don't breathe! Oh, don't breathe, hold your breath, Janey!"

But she couldn't keep smothering Donnie. Scrambling up in the total dark, Donnie in her arms, she stumbled. Righting herself, Cassie shifted Donnie over her right shoulder—he was so *heavy*—and groped in the dark for Janey. She caught her daughter's screaming head, moved her left hand to Janey's shoulder, dragged her in the direction of the door. What she hoped was the direction of the door.

"Janey, shut up! We're going out! Shut up!"

Janey continued to scream. Cassie fumbled, lurched—where the hell *was* it?—found the door. Turned the knob. It opened, unlocked.

"*Wait!*" Elya called, running across the trampled lawn toward Bollman. "Don't waco! Wait! I called the press!"

He swung to face her and she shrank back. "You did *what?*"

"I called the press! They'll be here soon and the AI can tell its story and then release Cassie and the children!"

Bollman stared at her. Then he started shouting. "Who was supposed to be watching this woman! Jessup!"

"Stop the tank!" Elya cried.

It continued to move toward the northeast corner of the castle, reached it. For a moment, the scene looked to Elya like something from her childhood book of myths: Atlas? Sisyphus? The tank strained against the solid wall. Soldiers in full battle armor, looking like machines, waited behind it. The wall folded inward like pleated cardboard and then started to fall.

The tank broke through and was buried in rubble. She heard it keep on going. The soldiers hung back until debris had stopped falling, then rushed forward through the precariously overhanging hole. People shouted. Dust filled the air.

A deafening crash from inside the house, from something falling: walls, ceiling, floor. Elya whimpered. If Cassie was in that, or under that, or above that. . . .

Cassie staggered around the southwest corner of the castle. She was carrying Donnie and dragging Janey, all of them coughing and sputtering. As people spotted them, a stampede started. Elya joined it. "Cassie! Oh, my dear. . . ."

Hair matted with dirt and rubble, face streaked, hauling along her screaming daughter, Cassie spoke only to Elya. She utterly ignored all the jabbering others as if they did not exist. "He's dead."

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For a heart-stopping moment, Elya thought she meant Donnie. But a man was peeling Donnie off his mother and Donnie was whimpering, pasty and red-eyed and snot-covered but alive. "Give him to me, Dr. Seritov," the man said, "I'm a physician."

"*Who,* Cassie?" Elya said gently. Clearly Cassie was in some kind of shock. She went on with that weird detachment from the chaos around her, as if only she and Cassie existed. "Who's dead?"

"Vlad," Cassie said. "He's really dead."

"Dr. Seritov," Bollman said, "come this way. On behalf of everyone here, we're so glad you and the children—"

"You didn't have to waco," Cassie said, as if noticing Bollman for the first time. "I turned T4S off for you."

"And you're safe," Bollman said soothingly.

"You wacoed so you could get the back-up storage facility as well, didn't you? So T4S couldn't be re-booted."

Bollman said, "I think you're a little hysterical, Dr. Seritov. The tension."

"Bullshit. What's that coming? Is it a medical copter? My son needs a hospital."

"We'll get your son to a hospital instantly."

Someone else pushed her way through the crowd. The tall woman who had installed the castle's wiring. Cassie ignored her as thoroughly as she'd ignored everyone else until the woman said, "How did you disable the nerve gas?"

Slowly, Cassie swung to face her. "There was no nerve gas."

"Yes, there was. I installed that, too. Black market. I already told Agent Bollman, he promised me immunity. How did you disable it? Or didn't the AI have time to release it?"

Cassie stroked Donnie's face. Elya thought she wasn't going to answer. Then she said, quietly, under the din, "So he did have moral feelings. He didn't murder, and we did."

"Dr. Seritov," Bollman said with that same professional soothing, "T4S was a machine. Software. You can't murder software."

"Then why were *you* so eager to do it?"

Elya picked up the screaming Janey. Over the noise she shouted, "That's not a medcopter, Cassie. It's the press. I . . . I called them."

"Good," Cassie said, still quietly, still without that varnished toughness that had encased her since Vlad's murder. "I can do that for him, at least. I want to talk with them."

"No, Dr. Seritov," Bollman said. "That's impossible."

"No, it's not," Cassie said. "I have some things to say to the reporters."

"No," Bollman said, but Cassie had already turned to the physician holding Donnie.

"Doctor, listen to me. Donnie has Streptococcus pyogenes, but it's a genetically altered strain. I altered it. What I did was—" As she explained, the doctor's eyes widened. By the time she'd finished and Donnie had been loaded into an FBI copter, two more copters had landed. Bright news logos decorated their sides, looking like the fake ones Bollman had summoned. But these weren't fake, Elya knew.

Cassie started toward them. Bollman grabbed her arm. Elya said quickly, "You can't stop both of us from talking. And I called a third person, too, when I called the press. A friend I told everything to." A lie. No, a bluff. Would he call her on it?

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Bollman ignored Elya. He kept hold of Cassie's arm. She said wearily, "Don't worry, Bollman. I don't know what T4S was designed for. He wouldn't tell me. All I know is that he was a sentient being fighting for his life, and we destroyed him."

"For *your* sake," Bollman said. He seemed to be weighing his options.

"Yeah, sure. Right."

Bollman released Cassie's arm.

Cassie looked at Elya. "It wasn't supposed to be this way, Elya."

"No," Elya said.

"But it *is*. There's no such thing as non-competing technologies. Or non-competing anything."

"I don't understand what you—" Elya began, but Cassie was walking toward the copters. Live reporters and smart-'bot recorders, both, rushed forward to meet her. O

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ON BOOKS

Peter Heck

THE TELLING
by Ursula K. Le Guin
Harcourt, $24.00 (hc)
ISBN: 0-15-100567-2

Ursula K. Le Guin remains among the most respected figures in modern SF. She is probably the leading practitioner of a kind of anthropological SF, where much of the interest is in the workings of the society in which the story takes place. So her return to the "Hainish" universe in which almost all her SF novels have been set is obviously something of an event, the more so because she has not been especially prolific: this is only the seventh book in a series that began in 1966, and the first since 1977. It is a book that is almost certain to make its appearance on awards ballots and bestseller lists.

The Telling follows Sutty, a young woman assigned as an Observer on Aka by the Ekumen, which studies the cultures of the scattered human world. Aka is under the control of a monolithic Corporate State, which imposes a materialistic culture dedicated to building an indigenous space program. As a step toward building their new society, the authorities have outlawed local languages and customs, traditional literature, and especially all forms of the planet's once-dominant religion. Le Guin draws an explicit parallel between the history of Aka and the suppression of Taoism in China during the Cultural Revolution; however, it would be easy to draw parallels to our own society.

As the novel begins, Sutty's mission on Aka has left her frustrated. Her specialty, the ancient scripts and languages of Aka (recorded by the Ekumen's first expedition to Aka, many years before), has become all but obsolete with the new regime. Now, at last, the regime seems to be relaxing its campaign to obliterate the past. Sutty is given permission to visit a provincial city, with the tacit purpose of discovering remains of the old culture. As expected, upon her arrival she begins to make friends with the locals, and soon becomes aware that the suppressed religion is alive and well—in fact, a good bit more alive than anyone had expected. The main conflict comes from the presence of a government agent who trails Sutty, hoping she will lead him to the holdouts against the new regime.

Le Guin lets the narrative unfold slowly, generating suspense without a great deal of external action. The plot tends to unfold in quiet conversations between characters, or in Sutty's sitting at the feet of traditional storytellers, listening. As often with Le Guin's work, the real energy of this novel is invested in figuring out how its particular society works, and its effect on the people who live in it. Sutty's major discoveries remain ambiguous, open to interpretation. The resolution is mixed, without a clear-cut triumph by either of the sides in conflict. Similarly, the prose is understated, almost to the point of plainness—although this is a simplicity that upon examination reveals a very high level of craft.

The long gap since the previous "Hainish" novel freights this one

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with heavier expectations than if Le Guin had published three or four others over the last twenty years. For one thing, *The Telling* is likely to end up in the hands of a good many readers who read little or no other SF. Many of them will have heard that Le Guin is perhaps the finest writer in modern SF—and despite her sometimes coy statements about whether or not her books are really part of the genre, she is undeniably among the handful of writers who could claim that title. Those readers may find it puzzling that *The Telling* is not somehow a flashier and more expansive *magnum opus*, not more clearly a capstone to her career.

Such puzzlement might be natural, but to some extent it would miss the point of Le Guin's emphasis on oral story-telling, not only here but in several earlier works. Just as the Akan storytellers that Sutty discovers each see their tales as parts of a great whole created by all the other tellers of tales, *The Telling* is part of the larger structure created by all the "Hainish" novels. And while *The Telling* is a complete story in itself, readers new to Le Guin's work might find it helpful to read *The Left Hand of Darkness*, in order to see the new book in its fuller context. Readers who already know that context are likely to find *The Telling* a fitting continuation of the story they already know—as well as a perfect excuse to dip back into the earlier novels.

DARK SLEEPER
by Jeffrey E. Barlough
Ace, $14.95 (tp)
ISBN: 0-441-00730-9

Here's a debut novel that combines a Dickensian voice with material that might have come out in the glory days of *Weird Tales*. An incongruous-sounding mixture—but a strikingly successful one, to this reviewer's ears.

The primary setting is Salthead, a seaport town in a society that seems at first a stock nineteenth century backdrop. We slowly meet the main characters, and learn that something very strange is going on in Salthead. Eventually it emerges that we are in an alternate world, an offshoot from our history—or perhaps not, since certain obvious inventions (e.g,. gunpowder) seem to be missing. Contact with Europe was lost a long time ago. More surprisingly, sabertooths, and animals like the mastodon, which in our own history became extinct shortly after the first human settlers arrived in America, are alive and even commonplace.

Against this exotic backdrop unfolds a story that might have been a collaboration of Dickens and Lovecraft. Josiah Tusk, a wealthy miser who has much of Salthead in his pocket, instructs his none-too-scrupulous attorney to investigate the doings of a young man new to the city. At the same time, an amiable scholar undertakes the investigation of the strange events that have caught the attention of the townsfolk. These two plots almost immediately begin to intertwine with one another, as well as with several subsidiary plots involving a large cast of eccentric characters who might have stepped from the pages of *Bleak House*.

Barlough's command of the Dickensian voice is very good, keeping the tone convincing and never quite lapsing into outright parody. Better yet, he adopts not just the Dickensian voice but many typical Dickensian narrative strategies—stepping back from the events to comment as a spectator (who does eventually emerge as a character we have met), and using that viewpoint to remark on the events. Even the characters' names—Benjamin Blizzard, Jasper Winch, Sally Sprinkle, to pick a few—

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follow Dickens' model, adding to the book's feeling of authenticity. These strategies give the book the feeling of an actual document from the era in which the events it describes take place—even though it is clear almost from the start that its era is one that never existed.

Likewise, many of the characters are broad comic types, amusing even when they are engaged in something entirely serious. Many of them have recurring speech tags (another Dickensian technique), which gives them an air of caricature, bordering on surrealism. This comic touch also tends to make the darker elements of the fantasy stand out even more plainly. When the being alluded to in the title does make its appearance, it has considerably more impact than if it appeared against a more naturalistic background. This is all to the good, since it is not in itself particularly horrifying, even in comparison to the kind of monster that Lovecraft and his circle dealt in.

An impressive first novel; if you've enjoyed Tim Powers or John Crowley, this one might be your kind of read.

THE SKY ROAD
by Ken MacLeod
Tor, $24.95 (hc)
ISBN: 0-312-87335-2

Set in a distant future in which the population of Earth has rejected space travel, this new novel by MacLeod is another part of the future-history sequence that includes *The Stone Canal* (reviewed here last year).

We begin in Scotland, several centuries from now. Clovis colha Gree, a history grad student with a summer construction job, is seduced by a mysterious woman, Merrial—one of the "tinkers" who preserve a link to the lost scientific knowledge of the past. The two have in common their interest in a particular figure from the past: Myra Godwin, the Deliverer, who is somehow responsible for the current state of society. And, in alternate chapters, we meet Myra herself, and get a look at her period of history (a century or so in our future) from her point of view.

Myra, as it turns out, is among the leaders of the International Scientific and Technical Workers Republic, a small nation, carved out of ex-Soviet territory. Its economy is built on a clever scheme of selling nuclear "insurance" to other nations, and work camps that allow prisoners to repay their debt to society by working on space settlement projects. Now a new international crisis threatens to bring down not only the ISTWR but much of Europe. Meanwhile, in the far future, Merrial enlists Clovis to help her get hold of Myra's remaining papers and computer files. This brings him to the attention of several rival groups, unpleasantly complicating his personal life.

The twin plots move to their separate conclusions, as we learn how the Deliverer earned her sobriquet, and how Clovis's interest in her ultimately leads him to a significant role in launching a new phase in history. Readers of MacLeod's previous books will recognize several of the main characters; but while this book fills in a key era in his future history, it can certainly also serve as an introduction to the set. Well worth picking up; MacLeod is shaping up as one of the most important writers of the present era in SF.

FOOLS ERRANT: A Fantasy Picaresque
by Matthew Hughes
Warner Aspect $6.99 (pb)
ISBN: 0-446-60923-4

Here's a new book so reminiscent of Jack Vance's "Dying Earth" series that if I had run across it without an author's name attached, I might

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well have assumed that it was a new book by Vance. This is no light praise; I consider Vance's "Dying Earth" books, particularly *The Eyes of the Overworld,* among the most brilliant in modern fantasy. To strike that note, and sustain it convincingly, marks Matthew Hughes as a new face well worth attention.

The protagonist of *Fools Errant* is a callow young aristocrat, Filidor Vesh, nephew of the Archon of old Earth—like Vance's Dying Earth, an almost unrecognizably ancient world, where magic often has as much power as science. Filidor is trying to decide among his options for frittering away yet another evening when he receives a summons from the Archon to run an errand—a summons he at first attempts to duck. But Gaskarth, the elderly dwarf who brought the summons from his uncle, intercepts him and takes him to the palace. There he is given a small wooden box to deliver to the Archon, who is reported to be in a nearby rural district. He also picks up an ancient book that tells of the doings of a sage named Liw Osfeo, and (with Gaskarth as his guide) embarks on his quest.

As the title suggests, the quest almost immediately turns into a series of misadventures. Hughes sends Filidor through a series of one-dimensional societies, each of which represents the *reductio ad absurdum* of some social trait—ecological purism, rage for innovation, worship of professional sports. And at every turn, Filidor winds up in unwitting but flagrant violation of the local mores, usually to the point that he flees the country with a bloodthirsty mob howling at his heels. After each escape, Gaskarth tells the young man how, in spite of appearances to the contrary, he has managed to further the Archon's plans for that division of his nation.

All this is done with considerable wit, spiced with wildly irreverent episodes from the book of Liw Osfeo (which Filidor reads in between adventures). By the final chapters, Filidor has overcome several obstacles, defeated a powerful enemy, gained a degree of wisdom, and (at last) found out the truth behind his erratic quest. Astute readers will have guessed some of this truth, but Hughes manages to keep the information from being entirely predictable.

A delightful debut performance; it will be very interesting to see how Hughes follows this one up.

NIGHT OF MADNESS
by Lawrence Watt-Evans
Tor, $ 24.95 (hc)
ISBN: 0-312-87368-9

This new novel by Watt-Evans is the seventh set in his fantasy world Ethshar, and tells of a key event in its history: the unexpected arrival of a new and powerful form of magic in a complex, sophisticated society that has long since incorporated magic into everyday life.

The first couple of chapters introduce us to the city of Ethshar of the Spices, and to several key characters, notably Lord Hanner, a young Palace bureaucrat, and his uncle Lord Faran, chief advisor to the Overlord of the city. We learn that long experience with magic-users of all sorts has led to a ban on anyone with magical ability holding a governmental position of any sort. Magic is regulated by recognized guilds, which jealously enforce their internal rules, and take summary action against unauthorized use of their spells and knowledge. No individual is permitted to practice more than one form of magic.

Shortly after the novel begins, somewhere in the northern wilderness there is a meteor strike (or possibly a spaceship crash; the exact nature of the crucial event is never

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precisely spelled out), which confers the ability to do powerful magic on a large random sample of the population, including members of established magical guilds, beggars, thieves, and government officials—including Lords Hanner and Faran. The first reaction is predictable: widespread panic and civil unrest, with a fair amount of killing, looting, and destruction of property. The authorities (including Hanner, who finds himself away from the palace at the crucial moment) do what they can to regain control, and then the book really gets interesting.

Hanner and Faran end up as the de facto leaders of a group of the new magic-users—eventually dubbed "warlocks." This group quickly becomes the focus of both the resentment of those injured by the night of violence and the obstructions of those with a stake in the status quo. A new group with powers not yet regulated by any of the recognized magic guilds is a threat to one and all. And with aristocrats among its members, it is a particular threat to the government—as becomes evident when Faran's new powers begin to go to his head. Demonstrations of the group's abilities serve only to harden opposition, despite the warlocks' efforts at reconciliation and compromise.

The plot becomes increasingly complex, and several of the characters meet unanticipated fates. Despite a fair amount of violence, the tone of the book remains on the light side, with a sense of optimism that the main characters will find a way out of their difficulties. (Not all do, of course.) But Watt-Evans brings the story to an effective conclusion without betraying the realistic political and social consequences he has drawn from the story's precipitating event.

The Ethshar series is fairly loosely connected, and thus any of the books can in theory be read as a stand-alone. This one—a well-crafted, entertainingly told story—would be a fine place to start.

AMERICAN MONSTER
by Paul Semonin
New York University Press, $28.95 (hc)
ISBN: 0-8147-8120-9

Here's a science history that offers a fresh look at the early days of paleontology, when intellectuals began to realize that the large bones that were dug up from time to time represented not giants from before Noah's flood, but species of animals now extinct.

Semonin begins in the late years of the seventeenth century, when Puritan scholars like Cotton Mather (best known for his role in the Salem witch trials) saw no conflict in combining theology and natural science—in fact, Mather was the first to send a report of gigantic fossil bones (later identified as those of the American mastodon) to London's Royal Society. (Perhaps unsure of the author's scientific detachment, the RS published only a brief summary of Mather's lengthy tome.) But as explorers began to penetrate into the American interior, they sent back reports of large fossil beds, notably one at a place called Big Bone Salt Lick in Kentucky. At the same time, European scientists learned of frozen Siberian mammoths—another large, elephant-like creature not known in the present day.

It was the French naturalist Buffon who first dared to suggest that animal species might have become extinct. This was a direct challenge to the doctrine that God's creation was without flaws or gaps. Even Thomas Jefferson, hardly a slave to religious orthodoxy, fostered the hope that Lewis and Clark might discover living mammoths on their expedition to the northwest. Others

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favored the interpretation that God had allowed these enormous creatures to become extinct as a sign of special favor to the New World. (A few scholars even depicted the mastodons as ravenous carnivores, so that one reconstruction of the mastodon's skeleton reversed the tusks to make them look like fangs.) At the same time, Jefferson, Franklin, and other American philosophers became embroiled in an argument with Buffon over the relative size of European and American animals, using the fossils as a trump card to refute the notion of the degeneracy of New World creatures.

Semonin argues that still another agenda lay behind the emphasis on the wildness of the fossil creatures, namely a proof of the inferiority of untamed nature—and by extension, of "primitive" races such as the Indians or the African slaves. While there is no doubt that most of the natural philosophers of the eighteenth and nineteenth century were by our standards racists, Semonin does not convincingly forge the link between their interest in the "American monster" and their racial beliefs.

The author's tendency to portray scientific theories as subjective interpretations is an annoyance, as is his habit of relating events out of chronological sequence, often jumping back and forth between events separated by several decades. Even so, this is a fascinating look into not just the history of science, but into the history of the ideas that were the context of science in one of its revolutionary eras. Well worth a look. O

"BUT WHY WOULD YOU WANT TO GO OUT? WE GET THE WEATHER CHANNEL."

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SF CONVENTIONAL CALENDAR

The 2003 WorldCon will be in Toronto. Join now before the rates go any higher. Plan now for social weekends with your favorite SF authors, editors, artists, and fellow fans. For an explanation of con(vention)s, a sample of SF folksongs, info on fanzines and clubs, and how to get a later, longer list of cons, send me an SASE (self-addressed, stamped #10 [business] envelope) at 10 Hill #22-L, Newark NJ 07102. The hot line is (973) 242-5999. If a machine answers (with a list of the week's cons), leave a message and I'll call back on my nickel. When writing cons, send an SASE. For free listings, tell me of your con 6 months out. Look for me at cons behind the Filthy Pierre badge, playing a musical keyboard. - Erwin S. Strauss

MARCH 2001

2–4—**ConSonance.** For info, write: **6167 Jarvis Ave. #17, Newark CA 94560.** Or phone: **(973) 242-5999** (10 am to 10 PM, not collect).rhiannon@arilinn.com. Con will be held in: San Francisco CA (if city omitted, same as in address). Guests will include: Urban Tapestry, Mike Stein, Dave Weingart. SF/fantasy folksinging.

2–4—**SentiCon. senticonmi@aol.com.** Lexington Hotel Suites, Grand Rapids MI. A small, media-oriented con.

9–11—**Name That Con. www.scsffs.org/ntc.** Ramada Six Flags, Eureka MO. P.J. Farmer, M.Z. Reichert.

16–18—**CoastCon, Box 1423, Biloxi MS 39533. (228) 435-5217.** Gulf Coast Coliseum, Biloxi MS. Nene Thomas.

16–18—**StellarCon, 4506-1A, Crowne Lake Cir., Jamestown, NC 27282 (336) 334-3159.** Greensboro NC Hilton.

16–18—**WillyCon, c/o Conn Library, Wayne NE 68787. scifict@wscgate.wsc.edu.** Wayne State College. F. Wu.

16–18—**RevelCon, Box 980744, Houston TX 77098. www.clever.net/cam/revelcon.** Adult media fanzines.

16–18—**Sleuthfest, 20218 NE 34 Ct., Aventura FL 33180. www.mwa-florida.org.** Ft. Lauderdale FL. Mysteries.

16–18—**Serialfest, c/o 52 Boustead Ave., Toronto ON M6R 1Y9. www.serialsquadron.8m.com.** Old movie serials.

17–18—**StarFury, 148a Queensway, London W2 6LY, UK. seanharry@aol.com.** Heathrow Park Hotel. Media.

21–25—**IAFA, c/o Hollinger, Trent U., Peterborough ON K9J 7B8. www.iafa.org.** Ft. Lauderdale FL. Academic

22–25—**AggieCon, MSC Box J1, College Station TX 77844. (979) 845-1515.** Student Center, Texas. A&M U. Elrod.

23–25—**LunaCon, Box 3566, New York NY 10008. www.lunacon.org.** Hilton, Rye Brook NY. Sheffield, Kress.

23–25—**MillenniCon, 143 Schloss Lane, Dayton OH 45418. (513) 933-0452.** Kings Island OH. Asaro, Tom Smith

23–25—**MidSouthCon, Box 11446, Memphis TN 38111. (901) 664-6730.** Airport Holiday Inn. Hamilton, A. Clark.

23–25—**GalactiCon, 6636 Shallowford Rd., Chattanooga TN 37421. galacticon@vei.net.** Ramada South. Paxson.

23–25—**PortmeiriCon, Box 66, Ipswich IP2 9TZ, UK. sixofone@netreach.net.** Portmeirion UK. "The Prisoner."

30–Apr. 1—**ICon, Box 550, Stony Brook NY 11790. (516) 632-6045.** State U of NY. Ellison, M. Roddenberry.

30–Apr. 1—**OdysseyCon, c/o Epps, 901 Jenifer, Madison WI 53703. oddcon@venture-1.com.** Edgewater Hotel.

30–Apr. 1—**ConViction, 4719 N. 66th #91, Omaha NE 68104. (402) 457-5773.** Quality Inn Central. L. Killough.

30–Apr. 1—**FilkOntario, 145 Rice Ave. #98, Hamilton ON L9C 6R3.** Mississauga ON. SF/fantasy folksinging.

30–Apr. 1—**Dementia, 342 Coachman Dr. #1-C, Troy MI 48083.** Holiday Inn, Southfield MI. "Funny songs."

30–Apr. 1—**Creation, 100 W. Broadway #1200, Glendale CA 91210.** (818) 409-0960. Pasadena CA. Star Trek.

APRIL 2001

6–8—**ConTraption, Box 214055, Auburn Hills MI 48321. www.contraption.org.** Detroit MI. C. Kiernan, P. Brite.

AUGUST 2001

30–Sep. 3—**Millennium PhilCon, Box 310, Huntingdon Valley PA 19006.** Philadelphia PA. WorldCon. $160.

AUGUST 2002

29–Sep. 2—**ConJose, Box 61363, Sunnyvale CA 94088. www.conjose@sfsfc.org.** San Jose CA. World Con. $120.

AUGUST 2003

28–Sep. 1—**TorCon 3, Box 3, Stn. A, Toronto ON M5W 1A2. www.torcon3.on.ca.** WorldCon. C$170/US$115.

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NEXT ISSUE

MAY COVER STORY

Robert Reed, one of our most frequent and most popular contributors, returns next month with our May cover story, a gorgeously colored, breakneck-paced, and edge-of-your-seat suspenseful Space Adventure that takes us to the far reaches of the solar system and deep *inside* the great gas giant Saturn, where, in the midst of a desperately dangerous and almost certainly fatal Close Encounter of a *very* close kind, we learn something about the qualities you must have if you want to be a "Hero." This one is vivid, exciting, and immensely entertaining, so don't miss it!

OTHER TOP-FLIGHT WRITERS

Eleanor Arnason, one of our most popular writers, who showed up on both the Hugo and the Nebula final ballot last year, returns with another fast-paced and exotic adventure of interstellar location-scout Lydia Duluth, this one pitting Lydia against the strangest and most powerful antagonist she's ever encountered, as she strives to escape the chill and deadly grip of "Moby Quilt"; **David Marusek**, one of the hottest new writers in science fiction today, author of the famous story "We Were Out of Our Minds with Joy," returns to take us on another visit to his strange and evocative future world, this one a powerful and autumnal study of "A Boy in Cathyland"; **Megan Lindholm**, returning after more than a decade's absence, gives us a harrowing, uncompromising look at what it means to be "Cut"; new writer **Daniel Abraham** delivers a warning parable about "The Lesson Half-Learned"; acclaimed British author **Brian Stableford** vividly describes "The Color of Envy" in a high-tech future world; and **John Alfred Taylor** takes us inside a busy Lunar civilization for some unforgettable sketches of "The Men on the Moon."

EXCITING FEATURES

Robert Silverberg's "Reflections" column gives a respectful farewell salute to the "Last of the Golden Age Warriors"; and **Paul Di Filippo** brings us "On Books"; plus an array of cartoons, poems, letters, and other features. Look for our May issue on sale on your newsstand on April 3, 2001, or subscribe today (you can now also subscribe electronically, online, at our new *Asimov's* Internet website, at *http://www.asimovs.com*), and be sure that you miss none of the great stuff we have coming up for you this year! Hey, and remember, a gift subscription to *Asimov's* makes a great Christmas gift, too!

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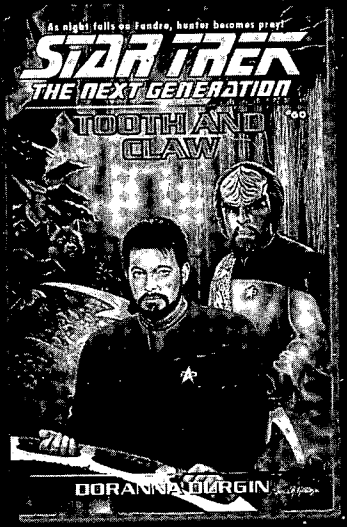

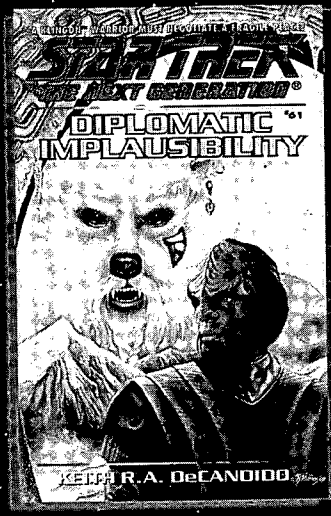

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